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ON THE GENERA OF CIXIIDÆ, MEENOPLIDÆ AND KINNARIDÆ (FULGOROIDÆ, HOMOPTERA)

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There are between ten and eleven hundred genera of Homoptera which are grouped together by most Homopterists as a single family, the Fulgoridæ. In a recent publication [1] the writer tried to show good reasons for regarding the genera of this group as consisting of fifteen families, which can be divided into two groups according to the types of male genitalia. Both the Tettigometridæ and the Cixiidæ were shown to contain genera belonging to both of these groups, and it was suggested that the two subfamilies of the Cixiidæ may have arisen separately from tettigometrid forms, and that the Tettigometridæ may be the modern specialized representatives of the primitive fulgorids. Since then the writer has had the opportunity to examine more genera of Tettigometridæ, and he has become more strongly convinced that this interesting group is of prime importance for understanding the relationship of the various families of fulgorids. While the Tettigometridæ are very similar in external appearances, they have very diverse forms of male genitalia, which, to the writer, indicates considerable antiquity. Mr. E. P. Van Duzee has expressed the opinion that the family is more distinctly separated from the rest of the fulgorids than are the other families from one another. This opinion the writer shares, and he has indicated it in the paper above mentioned, especially in the diagram of the affinities of the families. But he would not, on this account, sink the other families into one family, but rather consider the Tettigometridæ as a superfamily, if it be necessary to establish a distinction. If this should be done it could then be divided into two families, one in which the periandrium is large and the penis passes through

1 Proceedings Hawaiian Entomological Society, V, 2 (1923), pp. 205-247.

it (*Tettigometra*), and the other in which the periandrium is basad and the penis is distad (*Egropa*). The latter would then divide into two groups, one in which the genital styles are distinct and movable (*Egropa*), and the other in which they are missing or only represented by fixed processes (*Nototettigometra*). Until the male genitalia of more genera have been examined, it is not possible to say into which of the groups the other genera should be placed.

This conclusion naturally affects the classification of the Cixiidæ because the Meenoplinæ would be descended from a tettigometrid stock and the Cixiinæ from an egropid stock, and it would, therefore, be illogical to keep them in one family. Apart from this theoretical line of reasoning, there are very strong reasons for dividing Cixiinæ from the Meenoplinæ. The two groups are so very distinct that, were it not for the presence of the median ocellus, very few workers would place them together. As it is, the Meenoplinæ have been placed in the Derbidæ, Achilidæ, and Cixiidæ by different workers, which in itself is enough to indicate their distinctiveness.

The decision to regard the Cixiidæ and Meenoplidæ as two families raises the question as to the status of the genus *Kinnara.* This genus has the meenoplid type of male genitalia and so cannot go into the Cixiidæ, except as a matter of expediency to dispose of an inconvenient genus; its relationship to the Meenoplidæ is not close, and to place it in that family would be to break down the chief characters upon which that family is recognized. It holds the same position in the meenoplid group of families as *Achilixius* does in the cixiid group, and it appears to the writer that the best way to deal with it would be to place it in a family by itself, the **Kinnaridæ.** That this decision will meet with opposition from those who regard the whole of the fulgorids as only constituting one family is natural, but to those who consider them as constituting a number of families this decision will appear logical.

While the writer considers that the Cixiidæ (sens. lat.) should be divided into three families, in the present list and table he has dealt with them together, as most workers will expect to find them so, and the chief object of this paper is for convenience.

The list contains 120 generic and 2 subgeneric names, of which 88 are treated as good genera, 28 as direct synonomies,

3 as preoccupied, and 1 (*Bordicea* Walker) discarded for the present.

Most of the synonomies have been accepted by several workers and are, most probably, correct; some of the new synonomies may also be correct, but others may be open to doubt, and only represent the writer's present knowledge. The genus *Ptoleria* Stål, as recognized by the writer, is a large group, and it is hoped that future study will lead to the resurrection of some of the synonomized genera, but from his present knowledge the writer cannot uphold them.

LIST OF GENERA OF CIXIIDÆ (sens. lat.)

(‖ = direct synonomies; § = preoccupied)

1. ACHÆMENES Stål 1866, Hem. Afr. IV, pp. 165, 170. Type *A. notatinervis* Stål.
   ‖ *Adana* Stål 1856, Of. Vet. Ak. Fordh. XIII, p. 16. Type *A. westwoodi* Stål = *Bothriocera tinealis* Burm.
2. ADOLENDA Distant 1911, Ann. Mag. Nat. Hist. (8) VIII, p. 740. Type *A. typica* Dist.
3. ADOLENDANA Distant 1917, Trans. Linn. Soc. Lond. XVII, p. 278. Type *A. typica* Dist.
   ‖ *Adzapala* Distant 1911, Ann. Mag. Nat. Hist. (8) VIII, p. 739. Type *A. greeni* Dist. = *Oliarus* Stål.
4. AKA White 1879, Ent. Mo. Mag. XV, p. 216. Type *Cixius finitimus* Walker.
   ‖ *Amabalangoda* Distant 1912, Ann. Mag. Nat. Hist. (8) IX, p. 187. Type *A. insignis* Dist. = *Ptoleria* Stål.
5. ANDES Stål 1866, Hem. Afr. IV, p. 166. No species mentioned. Type *A. undulata* Stål 1871, Of. Vet. Ak. Forh., p. 747. This genus will date from the latter date. Syn. *Leirioëssa* Kirk.
6. ANIGRUS Stål 1866, Hem. Afr. IV, p. 172. Type *A. sordidus* Stål.
7. ANILA Distant 1906, Faun. Brit. Ind. Rhyn. III, p. 260. Type *A. fuliginosa* Distant.
8. AULOCORYPHA Berg 1879, Hem. Arg., p. 221. Type *A. punctulata* Berg.
   ‖ *Australoma* Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 114. Type *A. austrina* Kirk. = *Ptoleria* Stål.
   ‖ *Bajauana* Distant 1907, Ann. Mag. Nat. Hist. (7) XIX, p. 277. Type *Brixia rufula* Walk.
   ‖ *Barma* Distant 1906, Faun. Brit. Ind. Rhyn. III, p. 266. Type *B. diversa* Dist. = *Borysthenes* Stål.
   ‖ *Bathymeria* Muir 1922, Journ. Linn. Soc. N. S. W., p. 65. Type *B. helmsi* Muir = *Cajeta* Stål.
9. BENNA Walker 1857, Journ. Linn. Soc. Lond. I, p. 90. Type *B. capitulata* Walker.

10. BENNARIA Melichar 1914, Philip. Journ. Sci. D. IX, p. 175. Type *B. bimaculata* Mel.
11. BETACIXIUS Matsumura 1914, Annotat. Zoolog. Japan, VIII, 3-4, p. 412. Type *B. ocellatus* Mats.

—. BODECIA Walker 1868, Pro. Linn. Soc. Lond. Zool., X, p. 117. Type *B. varipes* Walk.

12. BORYSTHENES Stål 1866, Hem. Afr. IV, p. 165, no species mentioned; 1866, Berl. Ent. Zeit., p. 165, *Cixius finitus* Walker selected as type. Syn. *Barma* Dist.; *Vademela* Melichar.
13. BOTHRIOCERA Burmeister 1835, Handb. Ent. II, p. 156. Type B. *tinealis* Burm. Syn. *Adana* Stål.
14. BOTHRIOCERODES Fowler 1904, Bio. Cent. Amer. Hom. I, p. 80. Type *B. variegatus* Fowler.
15. BRIXIA Stål 1856, Of. Vet. Ak. Forh. XIII, p. 162. Type *Derbe natalicola* Stål. Syn. *Triopsis* Sign; *Curiatius* Dist.
16. BRIXIDIA Haglund 1899, Of. Vet. Ak. Forh. LVI, p. 60. Type *B. nebulosa* Hagl. (The type specimen is labeled *Brixiola nebulosa* Hagl.)
17. CAJETA Stål 1866, Hem. Afr. IV, p. 150, no species mentioned; 1866, Berlin Ent. Zeit. X, p. 391. *C. singularis,* type described. Syn. *Bathymeria helmsi* Muir.
18. CALAMISTER Kirkaldy 1906, Haw. Sugar Pltrs. Ent. Bull. I, p. 396. Type *C. obscurus* Kirk.
19. CALERDA Signoret 1863, Ann. Soc. Ent. France (4), III, p. 583. Type *C. biocellata* Sign.

    || *Caneirona* Distant 1916, Faun. Brit. Ind. Rhyn. VI, p. 38. Type *C. indica* Dist. = *Ptoleria* Stål.
20. CAROLUS Kirkaldy 1906, Haw. Sugar Pltrs. Ent. Bull. I (9), p. 401. Type *C. crispus* Kirk.

    || *Ciocixius* Metcalf 1923, Jour. Elisha Mitchell Scien. Soc., p. 183, Type *Cixius dorsivittatus* Van Duzee = *Pintalia.*
21. CIXIOSOMA Berg. 1879, Hem. Argen., p. 220. Type *C. platensis* Berg.
22. CIXIUS Latreille 1804, Hist. Nat. Crust. Ins. XII, p. 310. Type *Cicada nervosa* L. Syn. *Vincentia.*
23. COLVANALIA Muir. n. g.

    || *Commolenda* Distant 1911, Ann. Mag. Nat. Hist. (8) VIII, p. 741. Type *C. deusta* Dist. = *Ptoleria* Stål.

    || *Cotyleceps* Uhler 1895, Pro. Zoo. Soc. Lond., p. 63. Type *C. decorata* Uhler = *Pintalia* Stål.
24. CUBANA Uhler 1895, Pro. Zoo. Soc. Lond., p. 62. Type *C. tortrix* Uhler.

    || *Curiatius* Distant 1917, Trans. Linn. Soc. Lond. XVII, p. 285. Type *C. insignis* Distant = *Brixia* Stål.
25. DIACIRA Stål. 1860, K. Sven. Vet. Ak. Hand. III, No. 6, p. 3. Type *D. moerens* Stål.
26. DUILIUS Stål 1858, Of. Vet. Ak. Forh. XV, p. 319. Type *D. tenuis* Stål.

27. DYSTHEATIAS Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 113. Type *D. beecheyi* Kirk. Syn. *Quirosia* Kirk.; *Saccharias* Kirk.

‖ *Entithena* Fieber 1866, Verh. z. b. Ges. Wien. XVI, p. 499. Type *Flata musiva* Germ. = *Myndus* Stål.

28. EPARMENE Fowler 1904, Bio. Cent. Amer. Hom. I, p. 81. Type *E. pulchella* Fowler.

29. EPOLIARUS Matsumura 1910, Jour. Coll. Sci. Tokyo, XXVII, p. 11. Type *E. politus* Mats.

30. EPONISIA Matsumura 1914, Ann. Mus. Nat. Hung. XII, p. 285. Type *E. guttula* Mats.

31. EUCARPIA Walker 1856, Jour. Linn. Soc. Lond. Zoo. I, p. 159. Type *E. univitta* Walk.

32. EURYPHLEPSIA Muir 1922, Philip. Jour. Sci. XX, p. 114. Type *E. amboinensis* Muir.

33. GELASTOCEPHALUS Kirkaldy 1906, Haw. Sugar Pltrs. Ent. Bull. I, p. 396. Type *G. ornithoides* Kirk.

‖ *Haplacha* Lethierry 1874, Pet. Nouv. Ent. I, p. 444. Type *H. seticulosa* Leth. = *Hemitropis* Fieb.

34. *Haplaxius* Fowler 1904, Bio. Cent. Amer. Hom. I, p. 80. Type *H. lævis* Fowler.

35. HEMITROPIS Fieber 1866, Ver. z. b. Ges. Wien. XVI, p. 499. Type *H. bipunctata* Fieber. Syn. *Haplacha* Leth.

36. HUTTIA Myers 1924, Trans. New Zealand Inst. LV, p. 321. Type *H. nigrifrons* Myers.

37. HYALESTHES Signoret 1865, Ann. Soc. Ent. France (4), V, p. 128. Type *H. obsoletus* Sign. Syn. *Liorhinus* Kirschb.

38. INXWALA Distant 1907, Ins. Transval., p. 197. Type *I. modesta* Distant.

39. IOLANIA Kirkaldy 1902, Faun. Haw. III, p. 118. Type *I. perkinsi* Kirk.

40. IPSNOLA Signoret 1885, Ann. Soc. Ent. France (6), V, p. 69. Type *I. sextuberculata* Sign.

41. KERMESIA Melichar 1903, Hom. Faun. Ceylon, p. 52. Type *K. albida* Mel.

42. KINNARA Distant 1906, Faun. Brit. Ind. Rhyn. III, p. 289. Type *Pleroma ceylonica* Melichar. New name for *Pleroma* Melichar, preoccupied.

§ *Kirbya* Melichar 1903, Hom. Faun. Ceylon, p. 37. Type *K. pagana* Mel.; preoccupied = *Kirbyana* Dist.

43. KIRBYANA Distant 1906, Faun. Brit. Ind. Rhyn. III, p. 262. New name for *Kirbya* Mel. Syn. *Kirbyella* Kirk.

‖ *Kirbyella* Kirkaldy 1906, Entomologist, p. 248. New name for *Kirbya* Melichar = *Kirbyana* Dist.

44. KOROANA Myers 1924, Trans. New Zealand Inst. LV, p. 319. Type *K. helena* Myers.

45. KUVERA Distant 1906, Faun. Brit. Ind. Rhyn. III, pp. 255, 261. Type *K. semihyalina* Dist.
    || *Leirioëssa* Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 112. Type *L. tortricomorpha* Kirk. = *Andes* Stål.
46. LEPTOCHLAMYS Kirkaldy 1908, Haw. Sugar Pltrs. Ent. Bull. III, p. 113. Type *L. compressa* Kirk.
    || *Liorhinus* Kirschbaum 1868, Jb. Nass. Ver. Nat. XXI-XXII, p. 12. Type *L. albolimbatus* Kirsch. = *Hyalesthes obsoletus* Sign.
47. MACROCIXIUS Matsumura 1914, Annotat. Zoolog. Japan, VIII, p. 394. Type *M. giganteus* Mats.
48. MALPHA Myers 1924, Trans. New Zealand Inst. LV, p. 322. Type *M. muiri* Myers.
49. MEENOPLUS Fieber 1866, Ver. z. b. Ges. Wien, XVI, p. 498. Type *M. albosignatus* Fieber.
50. MELANDEVA Distant 1906, Faun. Brit. Ind. Rhyn. III, p. 268. Type *M. ocellata* Dist.
51. MESOLIARUS Matsumura 1910, Jour. Coll. Sci. Tokyo, XXVII, p. 9. Type *M. malagensis* Mats.
    || *Metabrixia* Fowler 1904, Bio. Cent. Amer. Hom. I, p. 80. Type *M. delicata* Fowler = *Pintalia* Stål.
52. MICRIXIA Fowler 1904, Bio. Cent. Amer. Hom. I, p. 80. Type *M. concinna* Fowler.
53. MICROLEDRIDA Fowler 1904, Bio. Cent. Amer. Hom. I, p. 81. Type *M. asperata* Fowler.
54. MNEMOSYNE Stål 1866, Hem. Afr. IV, p. 150. No species mentioned. Type *M. cubana* Stål 1866, Berl. Ent. Zeit. X, p. 391.
55. MONORACHIS Uhler 1901, Pro. Ent. Soc. Washington IV (4), p. 509. Type *M. sordulentus* Uhler.
56. MOYSELLA Horvath 1913, Ann. Mus. Nat Hungary, XI, p. 398. Type *M. sinaitica* Horv.
57. MUNDOPA Distant 1906, Faun. Brit. Ind. Rhyn. III, p. 263. Type *M. cingulensis* Dist.
58. MYNDUS Stål 1862, Berl. Ent. Zeit. VI, p. 307. Type *M. pictifrons* Stål. Syn. *Entithena* Fieber.
59. NESOCHARIS Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 110. Type *N. kalypso* Kirk. Syn. *Nesochlamys* Kirk.
    || *Nesochlamys* Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 115. Type *N. vitiensis* Kirk = *Nesocharis* Kirk.
60. NESOLIARUS Kirkaldy 1909, Pro. Haw. Ent. Soc. II (2), p. 76. Type *N. tamehameha* Kirk. Subgenus of *Oliarus* Stål.
61. NESOMYNDUS Jacobi 1917, Voeltzkow Reise in Ostafrika, III, p. 529. Type *M. australis* Jacobi.
62. NESOPOMPE Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 107. Type *N. felis* Kirk. Subgenus of *Oliarus* Stål.
63. NISIA Melichar 1903, Hom. Faun. Ceylon, p. 53. Type *Meenoplus atrovenosus* Leth.
64. NOTHOCHARIS Muir. n. g.

65. NYMPHOCIXIA Van Duzee 1923, Pro. Cal. Acad. Sci. (4) XII, p. 189. Type *N. unipunctata* Van Duzee.

66. ŒCLEUS Stål 1862, Berl. Ent. Zeit. VI, p. 306. Type *O. seminiger* Stål.

67. ŒCLIDIUS Van Duzee 1914, Trans. San Diego Soc. Nat. Hist. II, No. 1, p. 40. Type *O. nanus* Van Duzee.

68. OLONIA Muir. n. g.

69. OLIARUS Stål 1862, Berl. Ent. Zeit. VI, 306. Type *Cixius walkeri* Stål. Subgenera *Nesoliarus* Kirk.; *Nesopompe* Kirk. Syns. *Pentastira* Kirschb.; *Pentastiridius* Kirschb.; *Urvillia* Kirk.; *Adzapala* Distant; *Prosops* Buckton.

70. PACHYNTHEISA Fowler 1904, Bio. Cent. Amer. Hom. I, p. 81. Type *P. concinna* Fowler.

71. PARAMICRIXIA Distant 1911, Ann. Mag. Nat. Hist. (8) VIII, p. 742. Type *P. diaphana* Distant.

72. PARANDES Muir Philip. Jour. Sci. in press. Type *P. simplex* Muir.

73. PARANIGRUS Bergroth 1920, Ark. Zool. XII, No. 17, p. 18. Type *P. muiri* Bergroth.

74. PARANISIA Matsumura 1914, Ann. Mus. Nat. Hungary, XII, p. 283. Type *P. formosana* Mats.

§ *Paulia* Stål 1869, Svensk. Vet. Akad. Handl. VIII, No. 1, p. 94. Type *Delphax opposita* Fabr. Name preoccupied = *Southia* Kirk. n. n.

‖ *Pentastira* Kirschbaum 1868, Jb. Nass. Ver. XXI-XXII, p. 11. Type *P. major* Kirschb = *Oliarus* Stål.

‖ *Pentastiridius* Kirschbaum 1868, Jb. Nass. Ver. XXI-XXII, p. 11. Type *Flata pallens* Germar = *Oliarus* Stål.

75. PHACONEURA Kirkaldy 1906, Haw. Sugar Pltrs. Ent. Bull. I (9), p. 427. Type *P. froggatti* Kirk.

76. PINTALIA Stål 1862, Svensk. Vet. Akad. Handl. III, No. 6, p. 4. Type *P. lateralis* Stål. Syns. *Cotyleceps* Uhler; *Metabrixia* Fowler; *Ciocixius* Metcalf.

77. PLATYCIXIUS Van Duzee 1914, Trans. San Diego Soc. Nat. Hist. II, No. 1, p. 37. Type *P. calvus* Van Duzee.

§ *Pleroma* Melichar 1903, Hom. Faun. Ceylon, p. 41. Type *P. ceylonica* Mel.; preoccupied = *Kinnara* Distant n. n.

‖ *Prosops* Buckton 1893, Vict. Naturalist, X, p. 49. Type *P. pedisequus* Buckton = *Oliarus* Stål.

78. PROSOTROPIS Uhler 1895, Pro. Zoo. Soc. Lond., p. 70. Type *P. decorata* Uhler.

79. PTOLERIA Stål 1859, Berl. Ent. Zeit. III, p. 321. Type *P. arcuigera* Stål. Syns. *Australoma* Kirk.; *Bajauana* Dist.; *Caneirona* Dist.; *Commolenda* Dist.; *Ambalangoda* Dist.

‖ *Quirosia* Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 114. Type *Q. vitiensis* Kirk. = *Dystheatias* Kirk.

80. RHAMPHIXIUS Fowler 1904, Bio. Cent. Amer. Hom. I, p. 81. Type *R. championi* Fowler.

81. ROBIGALIA Distant 1916, Faun. Brit. India, Rhyn. VI, p. 56. Type *R. butleri* Distant.
    || *Saccharias* Kirkaldy 1907, Ann. Soc. Ent. Belg. LI, p. 125. Type *S. deventeri* Kirk. = *Dystheatias* Kirk.
82. SEMO White 1879, Ent. Mo. Mag. XV, p. 217. Type *S. clypeatus* White.
83. SALONAIMA Kirkaldy 1906, Haw. Sugar Pltrs. Ent. Bull. I, p. 396. Type *S. solonaima* Kirkaldy. Syn. *Talaloa* Distant.
84. SOUTHIA Kirkaldy 1904, Entomologist, XXXVII, p. 279. New name for *Paulia* Stål preoccupied. Type *Delphax opposita.* Fabr.
85. STENOPHLEPSIA Muir 1922, Philip. Jour. Sci. XX, No. 1, p. 117. Type *S. flava* Muir.
86. SUVA Kirkaldy 1906, Haw. Sugar Pltrs. Ent. Bull. I (9), p. 428. Type *S. koebelei* Kirk.
    || *Talaloa* Distant 1907, Ann. Mag. Nat. Hist. (7) XIX, p. 295. Type *T. pallescens* Dist. = *Solonaima* Kirk.
87. TIRITEANA Myers 1924, Trans. New Zealand Inst. LV, p. 325. Type *T. clarkei.*
88. TRIGONOCRANUS Fieber 1876, Rev. Zool. (3) III, p. 349. Type *T. emmeæ* Fieb.
    || *Triopsis* Signoret 1860, Ann. Soc. Ent. France (3) VIII, p. 187. Type *T. fasciata* Sign. = *Brixia* Stål.
88. TRIRHACUS Fieber 1876, Rev. Zool. (3) III, p. 354. Type *T. setulosus* Fieber.
    || *Urvillea* Kirkaldy 1907, Haw. Sugar Pltrs. Ent. Bull. III, p. 110. Type *U. melanesica* Kirk. = *Oliarus.*
    || *Vademela* Melichar 1914, Notes Leiden Mus. XXXVI, p. 100. Type *V. fusconotata* Mel. = *Borysthenes* Stål.
    || *Vincentia* Uhler 1895, Pro. Zool. Soc. Lond., p. 67. Type *V. interrupta* Uhler = *Cixius.*
90. VOLCANALIA Distant 1917, Trans. Linn. Soc. Lond. XVII, p. 279. Type *V. typica* Dist.

DICHOTOMOUS TABLE OF THE GENERA OF CIXIIDÆ (sens. lat.)

1. (142) Clavus not granulate.

CIXIIDÆ, sens. stric.

2. (133) No subantennal process and antennæ not sunk into a pit.

CIXIINI

3. (6) Sc, R and M all arising from basal cell and not forming a stalk; body laterally compressed; tegmina steeply tectiform.
4. (5) Front coxæ not produced, straight on outer margin, *Andes.*
5. (4) Front coxæ considerably produced and rounded on outer margin, *Parandes.*
6. (3) Sc, R and M not all arising from basal cell, two or more forming a stalk.

7. (100) Sc + R forming a stalk, M arising from basal cell, or from the base of Sc + R but not forming a common stalk with them.
8. (11) Base of abdomen with a pair of long, slender processes; abdomen laterally compressed, tegmina steeply tectiform.
9. (10) Median frontal carina distinct, *Benna.*
10. (9) Median frontal carina absent or indistinct, *Bennaria.*
11. (8) Base of abdomen without processes.
12. (37) Body considerably compressed laterally; tegmina steeply tectiform, apical margins coming together when at rest. Ovipositor generally complete, female pygofer generally longer than wide, sometimes with a longitudinal depression in which the ovipositor reposes.
13. (20) Vertex conical or the length in middle twice or more the width at apex; vertex generally produced considerably in front of eyes.
14. (15) Clypeus without lateral carinæ; no median frontal carina or only on apical half, *Gelastocephalus.*
15. (14) Lateral carinæ on clypeus and median carina on frons distinct.
16. (19) Length of vertex in middle considerably greater than width at base.
17. (18) Vertex narrow, base acutely angularly emarginate, apical transverse carina acutely angular, *Nesocharis.*
18. (17) Vertex broader, base roundly emarginate, apex truncate with the median carina of frons projecting in middle, apex but slightly narrower than base, *Adolendana.*
19. (16) Length of vertex less than the width at base, *Nothocharis.*
20. (13) Length of vertex in middle less than twice the width at apex.
21. (22) Seven apical Rs and seven apical Ms (1, a, b, 2, 3, 4, a), *Melandeva.*
22. (21) Four or less apical Rs and seldom more than five apical Ms.
23. (32) A distinct transverse carina across vertex, curved, angular or straight, apart from a carina more or less distinct dividing frons from vertex, which it ofttimes touches in the middle.
24. (27) Base of vertex acutely angularly, or deeply roundly emarginate.
25. (26) Apex of vertex angularly emarginate; apex of tegmina broad, subtruncate; forking of M3—4 near to Mf, M4a present. Second segment of antenna longer than wide, *Brixidia.*
26. (25) Apex of vertex not emarginate. Fork of M1-2 near to Mf; apex of tegmina round, *Cubana.*

27. (24) Base of vertex not angularly emarginate, straight or shallowly rounded.
28. (29) Face considerably wider than long, *Leptochlamys.*
29. (28) Face not wider than long, or but very slightly.
30. (31) Apex of vertex subequal in width to base, length subequal to width, sides slightly arcuate, median frontal carina projecting in front, *Achæmenes.*
31. (30) Vertex broader at base than at apex, *Pintalia.*
32. (23) No median transverse carina on vertex (not counting apical carina dividing vertex from frons).
33. (34) Vertex distinctly angularly emarginate at apex, *Kirbyana.*
34. (33) Vertex truncate at apex or very slightly produced or emarginate.
35. (36) Vertex rather long, length in middle equal to or greater than the width at apex, *Dystheatias.*
36. (35) Width at apex greater than the length in middle, *Ptoleria.*
37. (12) Body not considerably compressed laterally, tegmina not so steeply tectiform, apical margins not coming together when at rest. Ovipositor often incomplete, female pygofer often flat, broader than long and secreting long wax filments.
38. (39) M3 and M4 forking close to Mf; M1 and M2 forking much farther away from Mf, *Mnemosyne.*
39. (38) The fork of M1 and M2 nearer to Mf than the fork of M3 and M4.
40. (53) Mesonotum with five carinæ.
41. (42) Face without a median longitudinal carina, *Huttia.*
42. (41) Face with a median longitudinal carina, sometimes imperfect.
43. (44) Median frontal carina forked about middle, obscure over base of frons and apex of vertex; no transverse carina on vertex, *Malpha.*
44. (43) Median frontal carina simple or forked basad of middle.
45. (52) A transverse carina on vertex apart from the apical one.
46. (49) A median longitudinal carina between the transverse carina and base of vertex.
47. (48) Transverse carina forming a single arc, *Mesoliarus.*
48. (47) Transverse carina forming two arcs, *Epoliarus.*
49. (46) No median longitudinal carina on vertex, or only on basal portion and not reaching transverse carina.
50. (51) Vertex with an acutely angular transverse carina which joins the apical transverse carina in middle, thus forming two areolets on the apical lateral portions of vertex.
    (*a*) Hawaiian species, *Oliarus* subgenus *Nesoliarus.*
    (*b*) Not Hawaiian species, typical *Oliarus.*

51. (50) Vertex with a straight or nearly straight transverse carina generally near apex, which is not connected with the apical transverse carina.
    (*a*) Hawaiian species, *Oliarus* subgenus *Nesoliarus*.
    (*b*) Not Hawaiian species, *Oliarus* subgenus *Nesopompe*.
52. (45) No transverse carina on vertex (excluding apical transverse carina); Sc — R forking near stigma, Cu forking near apex of clavus, *Hyalesthes*.
53. (40) Mesonotum with less than five carinæ.
54. (55) Antennæ as long as face, second segment much longer than wide, *Solonaima*.
55. (54) Antennæ much shorter than face, second segment as wide as long or but a little longer than wide.
56. (63) Clypeus without median carina, with lateral carinæ.
57. (58) Vertex very short, width about eight times the length, *Moysella*.
58. (57) Vertex much longer in proportion.
59. (60) Clypeus convex, swollen, *Semo*.
60. (59) Clypeus flat, not swollen.
61. (62) Apex of vertex truncate, fairly wide. Sc + R forking at stigma, Cu forking at apex of clavus, *Eparmene*.
62. (61) Apex of vertex narrow. Sc + R and Cu forking considerably basad of stigma, *Hemitropis*.
63. (56) Clypeus with a median carina.
64. (65) Carina between vertex and frons obsolete, median frontal carina absent or only present on apical portion, *Kuvera*.
65. (64) Carina between vertex and frons and the median frontal carina distinct.
66. (67) Median frontal carina forking in apical half of frons, *Aka*.
67. (66) Median frontal carina simple or forking before middle or absent.
68. (85) Vertex without a transverse carina.
69. (74) Vertex much wider than long, apex truncate.
70. (71) Basal half of frons slightly convex, apical half concave, no median frontal carina, *Diacira*.
71. (70) Basal half of frons not convex, the whole more or less concave.
72. (73) Tegmina broad, Mf basad of middle, *Mundopa*.
73. (72) Tegmina narrower, Mf distad of middle, *Bothriocerodes*.
74. (69) Vertex as long as, or longer than, wide.
75. (76) Counting along the middle line more than half the vertex projecting beyond the eyes; apex roundly conical, *Carolus*.
76. (75) Counting along the middle line less than half the vertex projecting beyond the eyes; apex generally angular.
77. (82) A distinct median longitudinal carina on vertex.

78. (79) Base of vertex truncate or but slightly emarginate, *Trigonocranus.*

79. (78) Base of vertex distinctly and deeply emarginate.

80. (81) Median vein simple without branches, tegmina narrow beyond clavus, which reaches nearly to the apex, *Trirhacus.*

81. (80) Clavus ending considerably before apex beyond which tegmina is slightly broadened and round; M with 5 apical veins, 1, 1a, 2; 3, 4, *Olonia.*

82. (77) No median longitudinal carina on vertex.

83. (84) Length of vertex about six times the width, very narrow, width at apex subequal to base, *Volcanalia.*

84. (83) Vertex not so narrow, width at base subequal to length in middle, apex much narrower than base, *Colvanalia.*

85. (68) Vertex with a transverse carina apart from the carina between vertex and frons.

86. (87) Pronotum with a distinct shoulder carina behind the eyes to tegula, *Calamister.*

87. (86) Pronotum without shoulder carina; lateral pronotal carinæ following hind margin of eyes and approaching the lateral margin.

88. (93) Transverse carina of vertex straight, near the middle of vertex.

89. (90) Front coxæ large, front tibiæ and femora short and thick, *Cajeta.*

90. (89) Front legs slender, coxæ not large.

91. (92) No spines on hind tibiæ or very small ones, *Myndus.*

92. (91) Large spines on hind tibiæ, *Koroana.*

93. (88) Transverse carina on vertex angular, sometimes joining the apical carina in middle.

94. (99) Hind tibiæ with well-developed spines.

95. (96) A transverse vein in middle of costa, *Anila.*

96. (95) No transverse vein in middle of costa.

97. (98) Second segment of antennæ small, *Cixius.*

98. (97) Second segment of antennæ large, globose, *Cixiosoma.*

99. (94) Hind tibiæ without spines or only very small ones, *Iolania.*

100. (7) M arising from the stalk Sc + R some distance from its base, making a distinct, if a short, Sc + R + M stalk.

101. (104) Second segment of antennæ longer than broad; body considerably compressed laterally, tegmina steeply tectiform.

102. (103) Mesonotum 3—carinate, pronotum angularly emarginate on hind margin, *Brixia.*

103. (102) Mesonotum 1—carinate, pronotum nearly truncate on hind margin, *Southia.*

104. (101) Second segment of antennæ about as long as broad; tegmina not steeply tectiform.

105. (106) Mesonotum with 5 carinæ, *Œcleus.*

106. (105) Mesonotum with less than 5 carinæ.
107. (108) Vertex as long as, or longer than, pronotum and mesonotum together, produced considerably in front of eyes, *Rhamphixius.*
108. (107) Vertex much shorter, not produced greatly in front of eyes.
109. (110) Frons broader than long, subcircular, no median carina, *Microledrida.*
110. (109) Frons not subcircular, generally longer than wide.
111. (116) With a median frontal carina.
112. (113) Vertex conical in outline, with a short longitudinal carina, *Carolus.*
113. (112) Vertex not conical, apex truncate.
114. (115) With a straight transverse median carina on vertex, *Myndus.*
115. (114) Without a transverse carina on vertex, *Haplaxius.**
116. (111) Without a median frontal carina.
117. (118) Vertex much broader than long, *Pachyntheisa.*
118. (117) Vertex not broader than long.
119. (120) Vertex conical in outline; no lateral carinæ on clypeus, *Gelastocephalus.*
120. (119) Vertex not conical.
121. (122) Vertex very narrow, *Œclidius.*
122. (121) Vertex much broader.
123. (130) Length of frons subequal to width or not much longer than wide.
124. (127) Vertex with a median logitudinal carina.
125. (126) No carinæ on clypeus, *Duilius.*
126. (125) Clypeus carinate at sides; no median frontal carina, *Platycixius.*
127. (124) Vertex without a median longitudinal carina.
128. (129) Sc + R, M and Cu fork near the nodal line, *Micrixia.*
129. (128) Sc + R and Cu fork some considerably distant from nodal line.
130. (123) Frons about twice as long as broad, sides straight, widest at apex.
131. (132) Lateral carinæ of frons large, *Adolenda.*
132. (131) Lateral carinæ of frons small, *Paramicrixia.*
133. (2) Subantennal process present or antennæ sunk into pits.

BOTHRIOCERINI

134. (135) Face broadest at base, in lateral view strongly curved in front of eyes; antennæ sunk into pits, no subantennal process, *Bothriocera.*

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* *Nymphocixia* Van Duzee runs down to this genus but is easily distinguished by the occiput being arcuate and the base of the vertex overlapping the middle of pronotum; the frons also is longer than wide, narrow at base and gradually increasing to before apex; vertex with subparallel sides and deep keels.

135. (134) Face not broadest at base; with a subantennal process.
136. (137) Sc and R not forming a stalk or only a very short one, *Borysthenes.*
137. (136) Sc + R forming a long stalk.
138. (139) M arising from basal cell or from base of Sc + R; R touching M for short distance about level with node; costal cell wide, stigma large; claval fork near apex of clavus and claval vein in cases joining suture (Kinnaridæ), *Kinnara.*
139. (138) M arising from Sc + R stalk some distance from base.
140. (141) Sc + R forking near stigma, M arising from near middle of Sc + R which is thickened; costal cell large, *Eurypheplepsia.*
141. (140) Sc + R forking considerably before stigma; M arising nearer to base of stalk; Sc + R not thickened, *Stenophlepsia.*
142. (1) Clavus granulate.

MEENOPLIDÆ

143. (148) With a median frontal carina.
144. (145) Claval veins united near apex of clavus, *Phaconeura.*
145. (144) Claval veins united about the middle of clavus.
146. (147) Mesonotum with one carina, *Anigrus, Inxwala.*
147. (146) Mesonotum with 3 carinæ, *Paranigrus.*
148. (143) Without a median frontal carina.
149. (150) M leaving Sc + R stalk considerably beyond base, *Kermesia, Eponisia.*
150. (149) M leaving basal cell or the Sc + R stalk at base.
151. (154) Claval veins forking near apex of clavus.
152. (153) Clypeus with lateral carinæ, *Robigalia, Suva.*
153. (152) Clypeus without lateral carinæ, *Nisia.*
154. (151) Claval veins forking near middle of clavus.
155. (156) Vertex longer than broad, without a median carina, *Meenoplus.*
156. (155) Vertex not longer than broad, with a median carina, *Paranisia.*

(To be Continued)

Pleocoma Behrensi

The first heavy rain of the season at Berkeley fell on October 15. On the two days following, a number of *Pleocoma behrensi* Lec. were taken in Strawberry Cañon near Berkeley. Several males were taken in flight, and a few males and about twenty females were dug from their holes, which showed plainly in the packed earth of the trails.—A. C. Davis.

STUDIES OF WESTERN NORTH AMERICAN CARABINÆ (COLEOPTERA) WITH DESCRIPTIONS OF NEW SPECIES

BY EDWIN C. VAN DYKE
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Trachypachus slevini Van Dykė, new species

Robust, elongate, elliptical, piceous, brilliantly bronzed and shining above, less so beneath, antennæ rufo-piceous, legs rufous. Head three-fourths breadth of prothorax, convex, smooth and shining, eyes but slightly convex. Prothorax three-fourths as long as broad, apex emarginate, anterior angles prominent, base bisinuate; sides moderately arcuate in front, almost straight and parallel behind, rather broadly margined; disc convex, smooth and shining, median longitudinal line complete and finely impressed, basal transverse impression deep, ending externally in deep and oblique basal foveæ, the carinæ prominent and extending forwards and inwards from the hind angles. Elytra three-fifths as broad as long, slightly broader at base than prothorax, widest at middle; sides evenly arcuate from base to apex, apical angles quite acute; disc convex, deeply and coarsely punctured, finer at sides and apex, the punctures arranged in rows, the striæ but faintly defined and only near suture. Length, 7 mm.; breadth, 3 mm.

Type, a unique female, No. 1616, Mus. Calif. Acad. Sci., captured at **Olney** (near Astoria), **Oregon,** in July, 1911, by Mr. J. R. Slevin.

This fine species, I take pleasure in naming after its captor. It differs from our other species, *Trachypachus inermis* Mots. and *Trachypachus gibbsi* Lec., by being considerably larger, proportionally more elongate, less robust and convex, by having the eyes less prominent, and the elytra very coarsely punctured.

The tribe to which this insect belongs is a very peculiar one, both because of the physical peculiarities and the distribution. In appearance, the species resemble some of the smaller *Amara* or, even more, certain of the genus *Bembidium* like *Bembidium nitidum* Kirby. They, however, have a character, the extension of the posterior coxæ to the lateral margins, which is to be found in no other Carabidæ, and thus places them in a more or less isolated position. The tribe contains but two genera: *Systolosoma* Sol. with one species, *Systolosoma breve* Sol., restricted to Southern Chili, and *Trachypachus* Mots. with *Trachypachus zetterstedi* Gyll., found in the extreme northern portion of Europe and in Siberia, the two questionable species

Trachypachus transversicollis Mots. and *Trachypachus laticollis* Mots. from the Amur region of Siberia, and three species found in the northwestern part of North America. Of these last, *Trachypachus slevini* n. sp. has only been found as indicated at Olney, Oregon, that is, in the wet belt or maritime portion of the Pacific Slope; *Trachypachus inermis* Mots. along the Pacific Coast from Southeastern Alaska to San Francisco, California, and at high levels along the Cascade Mountains and northern Sierra Nevada Mountains and through the Rocky Mountains as far as Colorado; while *Trachypachus gibbsi* Lec. is found in western Washington and Oregon and continues along the coast into Humboldt County, California, and from Oregon along the Cascades and Sierra Nevada Mountains as far south as Mt. Whitney. The three species of *Trachypachus* described by Colonel Casey[1] are undoubtedly synonyms of the above, *Trachypachus alticola* Csy. being the same as *Trachypachus gibbsi* Lec. and *Trachypachus oregonus* Csy. and *Trachypachus specularis* Csy., the same as *Trachypachus inermis* Mots. My series of specimens not only runs them together, but shows a continuous distribution. *Trachypachus holmbergi* Mann. (Bul. Mosc. XXVI, 1853, p. 119) is a synonym of *Trachypachus inermis* Mots. and *Trachypachus californicus* Mots. (Bul. Mosc. XXXVII, 1864, p. 194) undoubtedly is a synonym of *Trachypachus gibbsi* Lec.

The following table will aid in separating our species:

Prothorax distinctly narrower at base than at middle, basal transverse impression deep.

Eyes slightly convex, elytra with rows of deep and coarse punctures over entire area. Length, 7 mm. ..... *slevini* n. sp.

Eyes very convex, elytra quite smooth, the basal portions of but three or four rows of minute punctures indicated. Length, 4.5-5.5 mm. ..... *inermis* Mots.

Prothorax but little narrower at base than at middle, basal transverse impression vague. Eyes prominent, the elytra with remnants of four or five rows of fine punctures. Length, 6. mm. ..... *gibbsi* Lec.

Elaphrus parviceps Van Dyke, new species

Moderately robust, somewhat shining, upper surface closely and finely punctate, greenish bronze, the sides more evidently greenish, ocellate spots of elytra a deep violet. Head slightly longer than broad across eyes, eyes but moderately prominent, far less so than is the rule

1 "Memoirs on the Coleoptera," IX, by Thos. L. Casey, April 8, 1920, pp. 144-146.

in the genus, the breadth of head across eyes as a result, but slightly greater than breadth of prothorax, front finely closely punctate. Prothorax longer than broad, less than two-thirds as broad as elytra at humeri and about two-fifths length of elytra, apex barely arcuate, base with a definite and broad median lobe; sides evenly rounded at anterior two-thirds, deeply sinuate posteriorly; posterior angles acute; disc irregular as usual. Elytra four-fifths as broad as long, broadest behind the middle; disc with two rows of three elongate callosities; ocellate spots well marked, but hardly depressed. Beneath coarsely and not closely punctured on head behind the eyes, on pro, meso, and metathorax and epipleuræ, the abdomen finely and sparsely punctate. Length, 7.5 mm.; breadth, 4 mm.

Type, a female, No. 1617, Mus. Calif. Acad. Sci., collected some years ago at **Teller, Seward Peninsula, Alaska,** by Mr. Robert M. Price and by him kindly presented to me. One or two other specimens have been seen in the United States National Museum collection.

This species superficially looks like a large robust *Elaphrus riparius* Linn., but it is distinctly separated from that, as well as from all of our other species by the much narrower head, the more prominent and acute posterior angles to the prothorax and the type of punctuation beneath. It is possible that this species may be the same as one of the old world species, but I have so far not been able to find any described one that will tally with it.

Elaphrus lævigatus Lec. and *Elaphrus caseyi* Leng (*politus* Casey) are one and the same, the type locality for both being San Francisco, California. Colonel Casey was evidently misled by the tables given in the Bulletin of the Brooklyn Entomological Society,[2] where *lævigatus* was erroneously listed from "Mich." and "Brit. Co." The species is confined to California.

Loricera pilicornis sierræ Van Dyke, new subspecies

Loricera semipunctata Esch. and *Loricera californica* Lec. are one and the same, the first name having priority. San Francisco, California, is the type locality for both. Dr. LeConte was in error in considering *semipunctatus* as a synonym of *Loricera cœrulescens* Linn. or, as it should be called, *Loricera pilicornis* Fab., the name *cœrulescens* Linn. not applying to a species of *Loricera* at all according to European authorities. *Loricera pilicornis* Fab. has never been found near the coast in

2 Bul. Brooklyn Ent. Society, vol. I, p. 6.

California, though a phase has been found in the high Sierra which I list as a variety under the name *sierræ*. This last is somewhat smaller than the usual *Loricera pilicornis* Fab., and smoother, but it has the obtuse hind angles to the prothorax, the æneous prothorax and general facies. *Loricera semipunctata* Esch. is, in reality, an offshoot of *Loricera decempunctata* Esch., the latter extending along the coast from Alaska to Mendocino County, California, the former replacing it to the south, being found in the counties of Sonoma, Marin, and San Francisco.

Loricera congesta Mann. is but a phase or subspecies at the most of *Loricera pilicornis* Fab. In a small series which I took near Dutch Harbor, Unalaska Island, Alaska, are a number which have the prothoracic disc with two well-defined foveæ such as were noted in the description of the original type from Kenai, as well as one or two without that feature. All of the specimens were quite robust, slightly larger than the usual *Loricera pilicornis* Fab. and with the striæ very well defined, but otherwise not different.

A revised table for the separation of our species would be as follows:

Elytra with a single series of foveolæ
  Sides of prothorax oblique posteriorly, hind angles obtuse
    Disc of prothorax without distinct foveolæ in front of middle
      Elytral striæ and punctures moderately coarse. Length, 7.5-9 mm. ..... *pilicornis* Fab.
      Elytral striæ and punctures fine. Length, 7 mm. ..... *pilicornis* var. *sierræ* n. subsp.
    Disc of prothorax with distinct foveolæ in front of middle. Length, 9 mm. ..... *pilicornis* var. *congesta* Mann.
  Sides of prothorax sinuate posteriorly, hind angles subrectangular, ... *semipunctatis* Esch.
Elytra with a double series of foveolæ
  Legs black, hind angles of prothorax rectangular ..... *decempunctata* Esch.
  Legs testaceous, hind angles of prothorax obtuse ..... *foveata* Lec.

The type of *Loricera pilicornis sierræ* n. subsp. is a male (No. 1618, Mus. Calif. Acad. Sci.) collected by myself near **Tallac**, Lake Tahoe, **California,** in June, 1899, and is in my collection.[3] Two female paratypes collected at the same time

[3] As my collection of Coleoptera has been deeded to the California Academy of Sciences, all my types will become a part of the type series of that institution.

are also in my collection, and I have placed here a fourth specimen from Bear Lake, San Bernardino Mountains, collected June, 1897, by Mr. H. C. Fall.

The bibliography and synonomy of our species should read:

1. *Loricera pilicornis* (Fab.). Syst. Ent. 1775, p. 243.
   neostica Lec., New Spec. Col. I, p. 3; Smith Misc. Coll. VI, 1863.
   Subsp. *uteana* Casey, Mem. Col. IX, 1920, p. 147.
   Subsp. *sierræ* Van Dyke, new subsp.
   Subsp. *congesta* Mann., Bul. Mosc. 1853, III, p. 121.
2. *Loricera semipunctata* Esch., Zoo. Atl. V, p. 25, t. 25, f. 7; Mann., Bul. Mosc., 1853, III, p. 122.
   californica Lec., New Spec. Col. I, p. 3; Smith Misc. Coll. VI, 1863.
3. *Loricera decempunctata* Esch., Zoo. Atl. V, p. 25, t. 25, f. 7; Mann., Bul. Mosc., 1853, III, p. 122.
4. *Loricera foveata* Lec., Ann. Lyc. Nat. Hist. N. Y., v., 1851, p. 180.

Nebria riversi Van Dyke, new species

Robust, elongate, head and prothorax black above with a slight purple reflection, the elytra a metallic greenish purple color, beneath somewhat rufo-piceous. Head with two rufous spots on the front between the eyes, four-fifths as broad as prothorax, eyes not prominent, barely projecting beyond the sides of the head, antennæ one-half length of body. Prothorax three-fifths as long at middle as broad, less than five-sevenths as broad as elytra, apex biemarginate, base slightly more than three-fifths as broad as prothorax at broadest part, and broadly and but slightly emarginate; sides broadly and evenly arcuate for anterior two-thirds, distinctly sinuate posteriorly, the lateral margin narrow, the anterior angles rounded and prominent, the posterior right; the disc slightly convex, with median longitudinal and anterior and posterior transverse impressions well defined. Elytra about three times as long as prothorax, elongate elliptical; humeri rounded; striæ deep and finely punctate, the intervals convex and regular, no evident foveæ. Legs long. Length, 17 mm.; breadth, 6.5 mm.

Type, male (No. 1619), allotype, female (No. 1620, Mus. Calif. Acad. Sci.), and paratype male and female in my collection, secured by myself from out of rocky crevices along the margins of a glacial stream at the base of the Lyell Glacier, about 11,500 feet, on **Mt. Lyell, California,** July 13, 1921. Another paratype loaned to me for study by Dr. Hans Roeschke of Berlin was captured many years ago by Mr. John Lambert on the same mountain and presented to Mr. J. J. Rivers, later going with the sale of the Rivers' collection of Carabidæ to Dr. Roeschke.

This splendid and very local species is probably our largest Nebria, being slightly larger than large *Nebria trifaria* Lec. or *Nebria ingens* Horn. It somewhat resembles the latter and is perhaps related to that, but it is generally more robust, is decidedly metallic above, in contrast to the inky blackness of the other, has the elytral humeri more prominent, indicating a less degree of alar atrophy, and the elytral striæ somewhat deeper and more definitely punctured. In neither are there any marked interruptions of the intervals, and the eyes in both are somewhat reduced in size. The general shape of the elytra is much the same as that of *Nebria purpurata* Lec.

Nebria schwarzi Van Dyke, new species

Large robust, a deep and brilliant metallic violet color both above and beneath, with the exception of the antennæ, mouthparts, scutellum, tibiæ and tarsi, which are black. Head a bit less than seven-ninths breadth of prothorax, no interocular red spots, eyes moderately prominent, antennæ long and delicate, extending beyond the middle of the elytra. Prothorax five-ninths as long as broad, nine-elevenths as broad as elytra, apex deeply emarginate; sides rather broadly arcuate for anterior two-thirds, gradually sinuate behind and with large rectangular hind angles, the reflexed margin narrow and evenly elevated, the sulcus within shallow and not broad; the base narrowly biemarginate; the disc convex with the median longitudinal line finely impressed, the anterior and posterior transverse impressions broad, shallow and well marked, the anal and basal areas finely, irregularly punctate. Elytra almost four times as long as prothorax, base almost transverse, humeri well defined but rounded at apex, the sides quite straight and parallel, the margin fine; the disc slightly convex but flattened at middle, the striæ deeply impressed throughout and with the punctures very vague, the intervals convex, generally broader behind, the third, fifth and seventh distinctly catenate throughout, the foveæ varying from seven to eight per stria. The true wing is 3 mm. longer than elytra, the veins large and heavily pigmented throughout, the membrane anteriorly more or less pigmented but posteriorly distinctly hyaline. The legs moderately long but well developed. Length, 14 mm.; breadth, 5.5 mm.

Type, male, collected by Mr. E. A. Schwarz at **Banff, Alberta,** October 6, bearing the number 1057 and belonging to the United States National Museum. This specimen was kindly loaned to me some years ago by Mr. Schwarz for purposes of study. Several paratypes, males and females, have been selected and designated from a series of twenty specimens in my collection, secured by my wife and myself from the margins of a stream which joins the Bow River at Banff, Alberta, June

15-17, 1918. This glorious species, the most beautiful in our fauna, is named in honor of Mr. E. A. Schwarz. It is rather closely related to the species which I am describing next, and, with that, belongs to the *Metallica* group of *Nebria*. It is about as large as *Nebria trifaria* Lec. and has the interrupted elytral intervals as fully catenate, though it differs greatly otherwise, especially as regards color and form, in which latter respect it more closely resembles some phases of *Nebria metallica* Fisch. It, however, is much larger than this last and with the elytral intervals more convex.

Nebria piperi Van Dyke, new species

Large, robust, a deep and brilliant metallic violet above, antennæ, mouthparts, legs, and undersides black. Head three-fourths breadth of prothorax, no interocular red spots, eyes moderately prominent, antennæ long and delicate, extending beyond the middle of elytra. Prothorax five-eighths as long as broad, four-fifths as broad as elytra, apex deeply emarginate; sides rather broadly arcuate for anterior two-thirds, obliquely sinuate behind and with hind angles large and but slightly obtuse, the reflexed margin narrow and evenly elevated, the sulcus within of moderate depth and width, the base vaguely biemarginate; the disc convex with the median longitudinal line finely impressed, the anterior and posterior transverse impressions well marked, the anal and basal areas finely irregularly punctate. Elytra over three and a half times as long as prothorax, humeri prominent but well rounded; sides almost straight anteriorly, evenly rounded posteriorly, the margin fine, the disc slightly convex, but flattened at the middle, the striæ distinctly impressed and rather finely closely punctate, the intervals quite flat, broader behind, the third, fifth and seventh distinctly catenate, the foveal interruptions varying from five to seven per stria. The true wing at least 3 mm. longer than the elytra, the veins large and heavily pigmented, the membrane distinctly pigmented anteriorly, but also definitely suffused posteriorly, giving the wing a brown appearance. The legs moderately long, but well developed. Length 13 mm.; breadth, 5.5 mm.

Type, male (No. 1621), allotype, female (No. 1622, Mus. Calif. Acad. Sci.), and several paratype males and females, selected from a large series collected by Mr. A. M. Elliott along the margins of the Nesqually River, just below the foot of the Nesqually Glacier, **Mt. Rainier National Park, Washington,** October 5, 1912, and kindly presented to me by the late Professor O. B. Johnson of Seattle. I also collected a good series of the species myself at the same locality, during July, 1920, and have other specimens from Mt. Baker, Washington, collected by Professor Trevor Kincaid, the Olympic Mountains

and Glacier Peak, Washington, and British Columbia. It is named in honor of the botanist, Mr. C. V. Piper, in recognition of his efforts to add to our knowledge of the alpine Coleopterous fauna of the Cascade Mountains.

This species belongs near *Nebria schwarzi* n. sp. and superficially closely resembles it. It differs from that by being slightly shorter and by having the elytra proportionally broader, smoother, the striæ shallower and definitely punctured, the intervals quite flat, and by having the true wings pigmented throughout. These two quite distinct species, though evidently of common origin, now occupy quite distinct territories: *schwarzi* the northern Rockies of Canada, and *piperi* the more northern mountains of Washington.

Nebria meanyi Van Dyke, new species

Elongate, black, elytra a deep violet with slight greenish tinge in certain lights, legs piceous, shining. Head five-sevenths breadth of prothorax, with two obscure reddish spots on front between the eyes, eyes moderately prominent, antennæ long and delicate, two-thirds length of body. Prothorax five-sevenths as long as broad, seven-tenths as broad as elytra, apex deeply emarginate; sides broadly arcuate for anterior two-thirds, subangulate at point of greatest width, abruptly sinuate behind and straight and almost parallel for posterior fourth; lateral margin moderate in width and strongly inflexed, the sulcus within deep and quite broad; anterior angles prominent and narrowly rounded at apex; posterior angles prominent, subacute and projecting slightly backwards; base broadly shallowly emarginate; disc slightly convex and vaguely and somewhat transversely strigose, the median longitudinal line finely impressed; anterior and posterior transverse impressions well marked; anal and basal areas punctate. Elytra over three times as long as prothorax, with humeri well defined but rounded, the margin rather fine; disc somewhat convex, but flattened at middle; striæ fine, distinctly impressed and finely punctured, the second to the seventh quite sinuate posteriorly; intervals narrowed and convex in front, broader and flatter behind, the third, fifth and seventh distinctly catenate or interrupted in posterior half by about five shallow foveæ. True wing at least 2 mm. longer than the elytra, the legs long and slender. Length, 13 mm.; breadth, 4.5 mm.

Type, male (No. 1623), allotype, female (No. 1624, Mus. Calif. Acad. Sci.), and two paratype females, in my collection, taken under rocks close to the Nesqually River and but a short distance below the foot of the glacier, in the **Mt. Rainier National Park, Washington,** September 5, 1912, by Mr. A. M. Elliott. Five other specimens are also in my collection, three

secured by myself at the same locality, July 15, 1920, and two from Glacier Peak, Washington, collected June 30, 1910, by Professor E. S. Meany. All of the specimens not collected by myself were kindly presented to me by Professor O. B. Johnson, in whose collection, now belonging to the University of Washington, are other specimens. The species is named for Professor Meany, in appreciation of his generosity in acting as a collector in the high mountains of Washington.

This species superficially looks much like *Nebria purpurata* Lec. and should be placed close to that in our lists, but it differs by having the elytra alone distinctly metallic, the prothorax more evidently constricted behind, the sides posteriorly parallel and the hind angles subacute, in contrast with the oblique sides and obtuse hind angles of *purpurata,* by having the lateral margins moderately broad, quite reflexed and with a broad sulcus within, as against a narrow margin and sulcus in the other, the elytral humeri more definite and the true wings longer than the elytra, whereas they are barely half the length in the other. This species is also liable to be confused with *Nebria gebleri* Dej. This latter is, however, generally more brilliantly metallic, often cupreous, a color lacking in the other, slightly smaller and distinctly proportionally shorter, with a broader prothorax, the elytra shorter, the striæ but vaguely punctate, the intervals flat, the third, fifth and seventh though more or less interrupted by the foveæ, not so regularly so nor so distinctly catenate. The true wings are also slightly shorter and broader than in *meanyi* and the small, wedge-shaped and oblong cells (see Ganglbauer [4]) much shorter and broader.

Nebria spatulata Van Dyke, new species

Elongate, narrow, piceous black, antennæ, palpi, tibiæ and tarsi somewhat rufous. Head moderately shining, with two red spots on the front, two-thirds as broad as prothorax, eyes moderately prominent, antennæ somewhat robust, though fully one-half length of body. Prothorax two-thirds as long as broad, three-fourths as broad as elytra, apex emarginate, base five-sixths as broad as prothorax at broadest part and faintly emarginate; sides moderately arcuate anteriorly, the posterior third oblique, convergent and barely sinuate, the anterior angles prominent and narrowly rounded, the posterior angles sharply defined and slightly obtuse, the margin narrow, the sulcus within fairly broad; the disc convex and with median longitudinal and anterior and posterior transverse impressions distinct, the lateral

[4] Ganglbauer, Die Käfer von Mitteleuropa, vol. I, p. 22, fig. 22, K.

areas slightly rugose, the posterior very much so. Elytra elongate elliptical, broadest at middle, over three times as long as prothorax, four-sevenths as broad as long; sides quite evenly arcuate from base to apex, the margins narrow; disc slightly convex, not flattened at middle, the seven inner striæ distinctly defined and finely impressed from base to apex and finely somewhat vaguely punctured, the intervals convex anteriorly, flattened behind and not interrupted, the third with two vague foveæ behind, and the seventh with three equally spaced and distinct foveæ. Legs long and delicate. Length, 10.5 mm.; breadth, 4 mm.

Type, a unique female collected by Mr. Ralph Hopping at **Franklin Lake, Tulare County, California,** September 8, and kindly loaned to me for purposes of study and description. This specimen will be deposited in the California Academy of Sciences (Type No. 1625) through the generosity of Mr. Hopping.

This species, because of its decidedly rounded humeri and undoubtedly atrophied wings, would come in our tables near *Nebria ovipennis* Lec. To my mind, however, it is but an offshoot of the *Nebria sahlbergi* Fisch. stock which with *Nebria ingens* Horn, itself an offshoot of *Nebria trifaria* Lec., has been left stranded in our high Southern Sierra and like it, through disuse, has completely lost its wings and as a result had the humeral area greatly reduced. In size, color and general appearance, it greatly resembles *Nebria castanea* Bon. of the Alps, though perhaps has its elytra even more like those of *Nebria cordicollis* Chd., a species also found in the Alps.

Nebria lyelli Van Dyke, new species

Elongate, narrow, nigropiceous, antennæ, mouthparts, tibia and tarsi, and median portions of undersides of body rufous. Head moderately smooth, the two rufous spots on the front between the eyes vaguely defined, somewhat over two-thirds breadth of prothorax, eyes moderately prominent, antennæ long and delicate, fully reaching the posterior third of the elytra. Prothorax two-thirds as long as broad, less than three-fourths as broad as elytra, apex biemarginate, base about four-fifths of greatest breadth of prothorax and slightly emarginate; sides decidedly arcuate anteriorly, sinuate posteriorly and almost parallel near hind angles, the anterior angles prominent and narrowly rounded at apex, the posterior angles sharply defined and right-angled, the margin narrow, likewise the sulcus within; the disc convex and with median longitudinal and posterior transverse impressions distinct, the anterior transverse less so, the posterior area punctate rugose, elsewhere quite smooth. Elytra elongate elliptical, broadest posterior to middle, over three times as long as prothorax,

two-thirds as broad as long, the margins narrow; disc slightly convex, slightly flattened at middle, the striæ well defined and moderately impressed, finely and distinctly punctate, the intervals convex anteriorly, somewhat flattened behind, not interrupted, the third striæ with from three to four vague foveæ. Legs long and delicate. Length, 10 mm.; breadth, 4 mm.

Type, male (No. 1626, Mus. Calif. Acad Sci.), and three paratype males in my collection, secured by me along the margins of glacier streams at an altitude of about 11,000 feet, on **Mt. Lyell,** Yosemite National Park, **California,** July 13, 1921.

This species is of about the same size and general appearance as the species previously described, but it differs chiefly as regards its antennæ, the shape of the elytra and the much more distinct punctuation of the striæ. It, in fact, looks much like a diminutive *Nebria gregaria* Fisch. *Nebria ovipennis* Lec., which is sometimes found with it is, of course, easily separated from it by its more robust build and larger size.

Nebria crassicornis Van Dyke, new species

Moderate in size, compactly built and dark brown, the margins of the prothorax and elytra somewhat lighter, and the palpi, antennæ and feet dark rufous. Head five-sevenths as broad as prothorax, interocular red spots not evident, eyes moderately prominent, antennæ short and stout, not reaching to the middle of the elytra. Prothorax at middle four-sevenths as long as broad, seven-ninths as broad as elytra, apex deeply emarginate; sides broadly arcuate anteriorly, thence oblique and acutely sinuate just in front of hind angles, the hind angles acute and slightly divergent; lateral margins of moderate width and evenly reflexed, the sulcus within rather shallow and vaguely punctured; base shallowly biemarginate; disc with the median longitudinal line finely though distinctly impressed, the anterior transverse impression distinct, the posterior deeper and punctured. Elytra three and a half times as long as prothorax at middle; humeri prominent but rounded, sides straight and but slightly divergent, the margin fine; disc convex, flattened at middle; striæ finely impressed, complete and but finely and vaguely punctate, the intervals quite flat, not interrupted; third striæ with from three to six fine foveæ (the type with four). True wings 4 mm. longer than the elytra; veins distinct; membrane slightly brownish, especially anteriorly. Legs stout and of moderate length. Length, 11 mm.; breadth, 4.5 mm.

Type, male (No. 1627), allotype, female (No. 1628, Mus. Calif. Acad. Sci.), and several paratypes, in my collection, captured by myself in **Paradise Park, Rainier National Park, Washington,** July 15, 1905. Paratypes will also be deposited

in the United States National Museum and Philadelphia Academy of Sciences. Several hundred specimens have been examined. It is very abundant on the slopes of Mt. Rainier (Mt. Tacoma), at altitudes between five and seven thousand feet, and has also been taken in other parts of the high Cascade Mountains, as on Glacier Peak, as well as on the Olympic Mountains of Washington. The species is generally to be found under cover in moist places in the woods, on the margins of bogs, and on the moist mountain slopes not far below the melting snow. They are rarely found close to running water, as is the case with most of the species of the genus.

This medium-sized, almost unicolorous greasy brown species, is very close to *Nebria labradorica* Casey, specimens of which I have from Jasper Park and Lake Louise, Alberta, in the Canadian Rockies, as well as from Labrador. It, however, differs from that by being generally more robust, with eyes less prominent, antennæ shorter and decidedly stouter, thorax broader, and true wings with both veins and membrane distinctly less pigmented. These two species no doubt had a common origin, but have sufficiently diverged to be recognized as distinct species. *Nebria crassicornis* n. sp. differs from all other American *Nebria* by its very robust antennæ; from the true *Nebria sahlbergi* Fisch., also by lacking the well defined interocular red spots, by having a broader and shorter prothorax, by lacking the distinct punctate striæ, and by being brown instead of black; from *Nebria rathvoni* Lec. by lacking the interocular red areas, the definite catenation of certain of the alternate elytral intervals, and the less parallel-sided elytra, as well as by its color; from *Nebria hudsonica* Lec. by having the prothorax broader proportionally at base, by being smaller, with shorter and stouter legs, as well as by being of a different color.

Metrius contractus planatus Van Dyke,
new subspecies

This subspecies or race differs from the typical species in having the prothorax quite flattened and the disc of the elytra also flattened. It is to be found only in the more alpine portions of the Lake Tahoe region of California as above Fallen Leaf Lake, Glen Alpine Springs, and Desolation Valley.

Type, male (No. 1629), and allotype, female (No. 1630,

Mus. Calif. Acad. Sci.), in my collection, taken by myself above **Fallen Leaf Lake**, Lake Tahoe region, **California,** June 20, 1915. Besides these I possess ten other specimens, some from the same locality, others from Desolation Valley at least 1500 feet higher, all quite similar. A number of these will be designated as paratypes.

The typical *Metrius contractus* Esch. extends along the coastal area of the Pacific States from western Washington to somewhat below Monterey, California, and along the western flanks of the Sierra Nevada Mountains to below Calaveras County, California. The subspecies *planatus* is an alpine race restricted to the middle Sierra and *Metrius subsericeus* Rivers, an offshoot of *Metrius contractus* Esch., which replaces it in the southern Sierra, that is, in the mountains of Fresno and Tulare Counties. At present we have no specimens from the territory between Calaveras and Fresno Counties, but when we do secure them the probabilities are that we shall find them to be intermediate between *Metrius contractus* Esch. and *Metrius subsericeus* Rivers, thus reducing the latter to a subspecies of the former.

The three forms of *Metrius* may be separated as follows:

General surface more or less shining.
Disc of prothorax and elytra convex ..... *contractus* Esch.
Disc of prothorax and elytra flattened.... *contractus planatus* n. subsp.
General surface opaque and with disc of prothorax and elytra very convex..... *subsericeus* Rivers

Promecognathus Chd.

There is but one species of this genus, *lævissimus* Dej. The other so-called species, *crassus* Lec. and *debilis* Casey, are not even true geographical races or subspecies. They are mere phases or forms which occur in all cases with the more typical form. The robust phase, *crassus* Lec., occurs only in the damp coastal valleys or cañons where the environment is at the optimum for the species, and the depauperized *debilis* Casey, as a rule, in the drier and more open country where conditions are the most unfavorable for the existence of the species. This peculiar type of polymorphism is parallel to that observed in some of the other subterranean Carabiadæ, like many of the Scaratinæ, as well as among many lignivorous Coleoptera, like the Lucanidæ, Dynastinæ, Cerambycidæ, Brenthidæ, and so

forth, and undoubtedly is primarily due to nutritional conditions.

Clivina californica Van Dyke, new species

Of the general size and form of *Clivina americana* Dej., smooth and shining, piceous black, antennæ, palpi, legs, narrow margins of prothorax beneath, epipleuræ, and posterior borders of ventral segments ferruginous. Head with deep punctiform frontal fovea; clypeus with large and distinctly separated lateral lobes; eyes moderately prominent. Prothorax ovate, obscurely dentate at hind angles, broadest just posterior to middle, thence convergent and gradually rounded to anterior angles, the anterior angles broadly rounded; disc quite convex, with longitudinal and anterior transverse grooves well impressed, a few fine transverse rugæ and a few fine punctures near the middle. Elytra over twice as long as prothorax, and itself about twice as wide as broad; humeri well rounded, sides almost straight and slightly diverging to beyond middle, thence gradually rounded and oblique to apex; disc moderately convex; sutural striæ complete, the next five not quite reaching the deeply grooved seventh at apex, all well impressed and very finely punctate in basal two-thirds, the intervals convex in front and flattened behind, the third with four well marked setigerous punctures. Anterior legs with the tibiæ provided with three well-developed spinous processes, the apical long and but slightly curved, directed almost directly forwards, the two lateral somewhat less prominent than in *americana;* femora deeply sinuate near the tip. Middle tibiæ without spurs near the tip on either side. The paranychia elongate. Beneath subopaque and finely alutaceous. Length, 5 mm.; breadth, 2 mm.

Type (No. 1631, Mus. Calif. Acad. Sci.), and paratype, in my collection, taken by myself on the shores of **Clear Lake, Lake County, California,** in May, 1895. Two other specimens, collected by Mr. Morton C. Lane at Banta, California, November 18, 1919, and now in his collection, have also been designated as paratypes.

This species belongs near *Clivina americana* Dej. and superficially resembles it. It differs from this, however, as well as from *Clivina analis* Putz. by being more convex, with the prothorax of a different shape, the sides anteriorly more rounded and convergent and the anterior angles more broadly rounded, the elytra proportionally shorter, with sides more rounded, apex more pointed, and the discal striæ more complete. From *Clivina punctulata* Lec., the only other *Clivina* found in California, it differs not only in color, but also by being more robust, less linear and parallel, and by not possessing the spur near the other margin of the middle tibiæ.

CLIVINA SULCIPENNIS Putz [5]

Within the last few years I have seen a number of specimens of what appear to be this species, which was unknown to Dr. LeConte and hence not listed in his synoptic table. They were all collected by Mr. H. P. Loding in the neighborhood of Mobile, Alabama. The beetles are slightly larger than *Clivina impressifrons* Lec., 6.5 mm. in length; black, with antennæ, mouthparts and legs rufous; head with punctiform frontal fovea and clypeus, with well-separated lateral lobes; prothorax as broad as long, with sides parallel, and disc impunctate; elytra with striæ absolutely complete and deeply impressed, sulcate, faintly punctate anteriorly and with convex intervals; anterior femora not dentate and the middle tibia with a spur near the outer tip. It would come in our tables near *Clivina rubicunda* Lec., but its size, color, and the very deep and absolutely complete striæ, will readily separate it from that as well as from any of our other species.

Schizogenius pygmæus Van Dyke, new species

Small, depressed, shining, rufous; antennæ, mouthparts and legs rufocastaneous. Head with frontal sulci well defined, the occipital area but moderately punctured and shining; eyes prominent, almost hemispherical; mentum toothed at middle, with lobes obliquely emarginate. Prothorax as broad as long, slightly convex; sides feebly arcuate, rather definitely convergent and rounded near anterior angles, the posterior angles rounded and with but a vague tooth; disc slightly convex, with the usual grooves well marked and the two marginal setæ present. Elytra depressed, over twice as long as broad and twice as long as prothorax; humeri rounded, with but vague dentations; striæ well impressed and distinctly punctured except near apex, the intervals flattened, the third, fifth and seventh with rows of setigerous punctures. Length, 3 mm., breadth, 8 mm.

Type (No. 1632, Mus. Calif. Acad. Sci.), and three paratypes in my collection, secured by myself on the shores of **Clear Lake, Lake County, California,** May, 1895.

This species in size, color and general appearance is much like *Schizogenius amphibius* Hald. and should be placed near it. It differs from that, though, by having much more prominent eyes, a less parallel-sided prothorax with the anterior and posterior angles more rounded, the posterior not distinctly dentate as in *amphibius,* by having both prothorax and elytra a bit more convex, and the elytra with more rounded humeri and but vague dentation there.

[5] "Revision Generale Des Clivinides," par J. Putzeys, Anns. Soc. Ent. Belgique, vol. IX (1886), p. 156.

TWO NEW CALIFORNIAN LIMACODID MOTHS

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

Monoleuca fieldi sp. nov.

Head, legs, and thorax deep rufous-brown. Fore wing: ochreous-tan; near the point of origin of vein 2, a deep rufous-brown narrow oblique line extends inwardly to middle of inner margin, not quite attaining same; this line is not edged by any white scales; from below costa near apex a faint suggestion of a line of similar color extends to about vein 5, parallel to outer margin; fringe tinged with purplish. Hind wing and fringe similar to fore wing, but somewhat paler in color. Beneath, pale yellowish, with some purple marking the fringes.

Expanse: 24 mm.

Belongs to the *occidentalis* group of the genus *Monoleuca,* but distinct, being of a much paler, yellower color and lacking white scales in the medial region.

Holotype, ♂, July, 1917 (George H. Field), unique. Barnes collection.

Type locality: Warner's, California.

Monoleuca disconcolorata sp. nov.

Head, legs, thorax, and primaries much like those of *fieldi,* markings similar, the mark below costa near apex stronger. Hind wing and fringe pale silken cream color, nearly white, the fringe along the inner margin somewhat tinged with purple. Beneath, pale yellowish, with some purple marking on the fringes.

Expanse: 21 mm.

May easily be distinguished from its closest ally, *fieldi,* by the disconcolorously pale hind wings.

Holotype, ♂, 8-15 July, unique. Barnes collection.

Type locality: Camp Baldy, San Bernardino Mountains, California.

NOTES ON SOME SPECIES OF LEPIDOPTERA IN RELATION TO THE STRETCH COLLECTION

BY WILLIAM BARNES AND F. H. BENJAMIN

The Stretch names in Lepidoptera have heretofore presented a decided problem. Fortunately, most of these were illustrated by Stretch and these illustrations are, on the whole, good. Those published as a part of "Illustrations of the Zygaenidæ and Bombycidæ of North America" are excellent. Other illustrations consist of plates II-XII of Stretch's manuscript "Heterocera Americana," and were published, 1906, Jour. N. Y. Ent. Soc., XIV, in connection with pages 117-125, on which are short footnotes by the editor, Dr. H. G. Dyar. There is, of course, no assurance that the specimens from which these last plates were made, in the case of Stretch names, were the actual types except in the cases where new names are put into print, the sole description being the figure.

Some time ago, we wrote to Mr. E. P. Van Duzee, explaining that some of the Stretch names were not definitely placed and asking if we might borrow the types. The Stretch collection is now in the California Academy of Sciences as a permanent loan from the University of California. At our instigation, Mr. Van Duzee took this matter up with the proper authorities, and on September 11, 1924, wrote as follows:

"You may have felt I was never going to send on the Stretch types, but I was only waiting to make sure I had them all. I have been over the Stretch collection repeatedly, and am able to find but twenty-eight specimens that can possibly be types. Of these, I think but two are so labeled . . . . In the cases of all of these species, I am sending all specimens in the Stretch collection, so if there are types they must be among these. They are a sorry-looking lot . . . . I cannot help feeling there should be more of his types in the collection, but they may have been destroyed by pests. I understand this collection was received by the University of California in bad shape, and was gone over and cleaned up by Rivers, and again later by someone at the University, and some of the type material may have been eliminated in that way."

By various means we were able to exclude a considerable proportion of the twenty-eight possible types from any pos-

sibility of their being actual Stretch types. Our notes on the remainder follow:

CISTHENE PLUMBEA Stretch

1885, Stretch, Ent. Amer., I, 102, *Cisthene.*
1893, Neumoegen & Dyar, Jour. N. Y. Ent. Soc., I, 115, *subjecta* var., *Cisthene.*
1900, Hampson, Cat. Lep. Phal. B. M., II, 370, pl. XXIX, f. 4, *Illice.*
1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 118, pl. III, f. 2, *Cisthene.*
1918, Draudt, in Seitz, Macrolepid., VI, 260, pl. XXXIII, C, *Illice.*

Two females, one bearing a name label, otherwise unlabeled, were received. These agree with the original description and published figures, and are probably types. The species is quite rare in collections. Besides these two specimens, the only other specimen known to us is the one in the United States National Museum, from which Hampson's plate was made. Draudt's figure is evidently copied from Hampson.

HALISIDOTA ARGENTATA SOBRINA Stretch

1873, Stretch, Zyg. & Bomb. N. Am., pp. 87, 135, pl. VI, f. 10, *Halesidota.*
1873, Hy. Edwards, Proc. Calif. Acad. Sci., V, 369, biol., *Halisidota.*
1890, Smith, Can. Ent., XXII 230, *Halisidota.*
1893, Neumoegen & Dyar, Jour. N. Y. Ent. Soc., I, 171, *argentata* race, *Halisidota.*
1901, Hampson, Cat. Lep. Phal. B. M., III, 149, *argentata* s. sp., *Halisidota.*
1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 123, pl. XI, f. 2, *Halisidota.*
1910, Rothschild, Nov. Zool., XVII, 56, *argentata* s. sp., *Halisidota.*

Described from a single ♂ from Lorquin, Coll. Stretch, California, exact locality unknown.

A wreck of a ♂, agreeing identically with Stretch's description and figure (of type) was received. This bears a label "California" and a small round pin label 282a. In all probability this is the type.

This subspecies is not common in collections. The Barnes collection only possesses two specimens, both males from Monterey County, California, May.

EUBAPHE AURANTIACA BREVICORNIS (Wlk.)

1865, Walker, Cat. Lep. Het. B. M., II, 536, *Crocota.*
belfragei (Stretch).
1885, Stretch, Ent. Amer., I, 103, *Crocota.*
1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 118, pl. III, f. 15, *Crocota.*

A single ♂ was received labeled "C. Belfragei Str." It

agrees well with the description, and is probably the type. It lacks the discal dot on the hind wing, but is otherwise quite typical of the form going under the name *brevicornis* in collections, to which it has already been sunk. At the present time we see no reason to retain separate names for forms with and without the discal dot on the hind wing.

EUBAPHE COSTATA (Stretch)

1885, Stretch, Ent. Amer., I, 103, *Crocota.*
1889, Smith, Can. Ent., XXI, 194, *Crocota.*
1893, Neumoegen & Dyar, Jour. N. Y. Ent. Soc., I, 157, *Eubaphe.*
1901, Hampson, Cat. Lep. Phal. B. M., III, 192, pl. XLII, f. 15, *Holomelina.*
1919, Seitz, Macrolepid., VI, 295, (pl. XXXVIII, C, as *fragilis*), *Eubaphe.*

Described from Texas (Belfrage).

A single ♂ was received, bearing the label "C. costata Str.," and also a small dark purple pin label indicative of Texas. In all probability this is the type.

This presumable type is considerably paler than all specimens in the Barnes collection from Texas, New Mexico, and Arizona, and matches Colorado specimens described by Barnes and McDunnough as race *pallipennis*. A very long series of both the Texas-Arizona race and the Colorado race are before us. The color difference seems constant. We consider the presumable type of *costata* to have faded sufficiently to appear in color practically identical with *pallipennis*.

EUBAPHE "OBSCURA" (Stretch)

1885, Stretch, Ent. Amer., I, 103, *Crocota.*
1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 118, pl. III, ff. 25-26, *Crocota.*

Described from "Pennsylvania, Strecker; New Hampshire, Fernald."

This name presents a very interesting problem. It was described in 1885, but not figured until 1906, when Stretch credited it to Strecker.

Evidently, three different forms are covered in the original description.

Two males were received, one bearing a label "Berks Cy. Pa.," the other merely bearing a name label *"Crocota obscura."* This latter specimen may or may not be a type. It well may be the "pale fawn" colored specimen mentioned in the original

description, which is possibly the "New Hampshire, Fernald" specimen. *E. opella* and its forms are not common north of Pennsylvania, the large New England specimens usually being forms of *immaculata*. This specimen, labeled simply *"Crocota obscura"* is not an *opella* form, but is an *immaculata* form. The hind wings show some black markings which cannot be clearly seen because of the bad condition of the specimen. We are inclined to consider it simply *immaculata* var. *trimaculosa* Reak.

No specimen was received which was concolorously smoky-brown, as mentioned in the original description. This type, which may have served as a basis for Figure 25 (1906) has presumably been either lost or destroyed. It appears to have been the form subsequently described as *belmaria* Ehrm.

The second specimen we received is accurately described in the original description, "Sometimes the primaries are fawn color and the secondaries smoky, in which case the head, thorax and abdomen are the color of the primaries." This specimen is the one bearing the label "Berks Cy. Pa." We have little doubt that this is one of the "Pennsylvania, Strecker" types, as we have seen similarly labeled material in the Strecker collection. This being the only reasonably certain "type" we restrict the name *obscura* to the form represented by this specimen. We decidedly believe in "lectotypes," but have not labeled this specimen "lectotype" because absolute certainty regarding its "type" status, is, of course, open to question.

A specimen compared by Benjamin with the type of *nigricans* Reak. (Strecker collection) agrees with this "type" of *obscura* Stretch.

The name *obscura* must be removed from the synonymy of typical *opella* and placed as a synonym of form *nigricans*. No form described or figured by Stretch under the name *obscura* could be placed as typical (but not form normal) *opella*.

A resume of the form names applicable to *opella* might be in order.

Hind wing red with little black; the black when present usually restricted to discal dot and basal shadings, fore wing yellowish to brownish tawny; immaculately red beneath.....*opella*

Hind wing usually with considerable black shading, the red usually restricted to costal area, fore wing darker to smoky.....*rubricosta*
Syn. *nigrifera* Wlk. (partim., "♀" nec ♂).

Hind wing bright yellow, with black discal dot and more or less black shading basally ..... **flava**
(Form nov. Holotype ♀, Quincy, Ill., June, O. C. Poling, Paratype ♀, New Brighton, Pa., June, in Barnes collection.)
Hind wing fuscous, with or without a slight rufous or fulvous cast, fore wing fulvous to fawn color ..... *nigricans*
Syn. *nigrifera* (partim., ♂ nec "♀").
Syn. *obscura* (sens. restr.).
Hind and fore wing unicolorously fuscous ..... *belmaria*
(Syn. *obscura* partim. nec sens. restr.)

Leptarctia californiæ form dimidiata Stretch

1873, Stretch, Zyg. & Bomb. N. Am., p. 123, pl. V, ff. 7-10, *Leptarctia.*
1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 119, pl. IV, ff. 13-15, *Leptarctia.*

Evidently described from a series of males, collections Edwards and Stretch. The "Edwards" mentioned by Stretch is presumably Henry Edwards, but Beutenmuller does not list any types of *dimidiata* in the Henry Edwards collection.

Two specimens were received bearing small round white pin labels "287a" and "287b," respectively, both being identified as "Leptarctia dimidiata" in the Stretch collection, but this label being on another (a common) pin. Neither of these appear to have served for any of Stretch's figures, but agree well with his description, which covers a variable form, and we think they probably are types. Neither have any yellow on the upper side of the hind wings. The fore wing of one, "287b," has the white markings more reduced than in Stretch's figure 7 (1873); the other has the fore wing transversely banded, somewhat as in Stretch's figure 9, but lacks the tongue of white extending into the cell, while the only other white markings besides the band is a small subapical spot.

Neoarctia yarrowii (Stretch)

1873, Stretch, Zyg. & Bomb. N. Am., p. 221, pl. IX, f. 7, *Arctia.*
1906. Stretch, Jour. N. Y. Ent. Soc., XIV, 119, pl. IV, f. 5, *Euprepia.*

Described from a single ♂, "pressed as flat as a botanical specimen," Arizona, collection R. H. Stretch, collected by U. S. Exploring Expedition, under Lieutenant Wheeler.

A single specimen was received, bearing a small square white label "21"; and another label "A. yarrowii Type," apparently in Stretch's handwriting.

This specimen agrees identically with the original descrip-

tion, including its flattened condition, and with Stretch's figures. There can be little doubt about it being the true type.

The species is correctly identified in collections, and we possess specimens agreeing with the type; in fact, one specimen is practically an exact match in the most minute details of its maculation.

Stretch's locality is peculiar, as we have seen the species only from high altitudes of Western Canada, Laggan, and Mt. Field.

APANTESIS INTERMEDIA (Stretch)

1873, Stretch, Zyg. & Bomb. N. Am., p. 216, pl. IX, f. 3, *Arctia.*

Described from a single male, Texas, Belfrage.

A single ♂ was received, the pin bearing a small round label "548," and above this a black label, which is indicative of Utah.

We do not know if this is the type or not. There may have been some error in labeling, the black label may have been added subsequently, or the specimen may actually have come from Utah, as we have lately received three specimens of this species from Mr. Spalding.

A second ♂, which was placed as *intermedia* by Stretch, cannot be the type, as it does not match his figure at all well, being form *stretchi* Grt.

APANTESIS PARTHENICE ab. APPROXIMATA (Stretch)

1885, Stretch, Ent. Amer., I, 104, *Arctia.*

1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 122, pl. VIII, f. 10, *Arctia.*

"Described from one ♀, sent me by Hy. Edwards, who states that he has another identically the same." "Hab. Canada."

A single ♀ was received. This bears a small printed label, "Canada," and a larger label, "What is this? I have another exactly same," in what appears to be Henry Edwards' handwriting. On the same label, above the question, is written "*A. approximata* Str."

This specimen agrees with Stretch's description (1885) and figure (1906). It is a rare aberration, and we have been unable to duplicate it. We have no doubt that this is the true type.

APANTESIS ORNATA ab. OBLITERATA (Stretch)

1885, Stretch, Ent. Amer., I, 105, *Arctia.*

1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 121, pl. VI, f. 14, *Arctia.*

Described from a single male received from W. H. Edwards, locality unknown.

A single male was received which appears to agree with the original description. It is labeled "Arctia obliterata Str. type." It is an old specimen, faded, rubbed and broken, the vestiture badly matted.

We see no real reason to doubt the authenticity or correctness of the type label which appears to be in Stretch's handwriting. The figure in the Journal of the New York Entomological Society, evidently a drawing, agrees in all of the essential details with this specimen. Granting that this is the type, that figure is not as well executed as most, but we believe this is due to the poor condition of the specimen confusing the artist, and that we have before us the original specimen from which that figure was made.

At first glance the type appears to represent a species belonging to the *quenselii* group, the hind wings so faded that they appear reddish-orange, like an occasional fresh specimen of Alberta *turbans*. As described by Stretch, the hind wing shows no basal black shade, but even in its present condition traces of the median spots are present.

It is possible that *obliterata* is a distinct species, as yet very rare in collections. We have seen no specimens other than the type. The markings of the hind wing seem to preclude the possibility of its being a form of *quenselii,* which, with *gelida* and *turbans,* is represented in the Barnes collection by fifty specimens, none of which shows the black median spots. We are inclined to agree with past placement as an aberration of *ornata,* which is probably the most variable species in the genus. We have about two hundred specimens representing *ornata* and its named and unnamed forms before us, although we fail to match the type of *obliterata* with any single specimen. The hind wings of *ornata* forms may be of any shade of yellow to red, more or less marked by black, the basal black shade often obsolete, three black median spots present or absent, the fore wing with veins marked or unmarked, and any of the transverse markings except the W mark may be obsolescent or completely lost. The size, also, varies greatly, typical *ornata* being much larger than form *edwardsii.*

Apantesis vittata phalerata (Harris)

1835, Harris, Rept. Geol. Mass., 2nd Ed., p. 593 (nom. nud.), *Arctia.*
1841, Harris, Ins. Inj. Veg. Mass., p. 245, *Arctia.*

pulcherrima (Stretch).

1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 122, pl. VIII, ff. 18-19, *phalerata* var., *Arctia.*

A single ♀ was received, labeled "Carbondale, Ills., July 22, 1882, French Coll.," the pin also bearing a label, *"A phalerata* v. *pulcherrima."*

This specimen agrees well with figure 18 of Stretch's plate, and is probably this type. It represents the general conception of ordinary female *phalerata.*

APANTESIS VITTATA PHALERATA ab. INCARNATA (Stretch)

1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 120, 121, pl. V, f. 21, pl. VII, ff. 4-5, *Arctia.*

Page 120 of original description reads, "21. *Arctia phalerata* var. *incarnata* ♂, n. var."; page 121 reads, "4. *Arctia phalerata* ♂, var. *incarnata* Stretch"; "5. *Arctia phalerata* ♂, var. *incarnata* Stretch." All three figures look somewhat different.

Figure 4 shows a well-marked hind wing, the fore wing with W-mark incomplete and apparently the costal area not marked by black.

Figure 5 shows the markings of the hind wings reduced, the fore wing with the W-mark complete, but a dotted line near the costa may indicate that the costa is black-marked.

Figure 21 indicates a hind wing heavily black-spotted, and, from the shading, in comparison with other figures, that the hind wing is decidedly red, the fore wing with complete W-mark and no indication of black on the costa basad of the "t. p." line.

A single specimen was received, labeled, "Carbondale, Ills., July 13, 1882. French Coll.," and a handwritten label, in what appears to be Stretch's handwriting, "A phalerata var. incarnata." This specimen is much like figure 5, but obviously not the original of that figure, as it lacks black dots between the anal and cubital veins of the hind wing. Although it was probably in Stretch's hands in 1906, because the name *incarnata* rests only on figures as a description, we fail to see how this specimen can be considered a type.

With the types of *incarnata* (the figured specimens) apparently lost or destroyed, this identification by Stretch is valuable as evidence of what he considered his name to represent. This specimen appears to be the ordinary Illinois form of *phalerata,* with a little less black than usual on the hind wing.

Having brought to light the facts now available regarding

this name and the single specimen now in existence in the Stretch collection so labeled, we will allow the matter to rest, awaiting some truly revisional worker in the group who may wish to disregard this specimen and select figure 21 as *incarnata,* as this figure has both page and plate priority, and also a slight indication that it probably was the original specimen selected by Stretch for the name because of its plate number being labeled "n. var.," rather than simply "Stretch."

With this in mind, we list the name as an ab. of *phalerata,* but wish to be clearly understood that in no way are we attempting to restrict the name *incarnata.*

EUCHÆTIAS ELEGANS Stretch

1873, Stretch. Zyg. & Bomb. N. Am., p. 189, pl. VIII, f. 6, *Euchætes* (!).

1901, Hampson, Cat. Lep. Phal. B. M., III, 416 (partim. nec text fig. 168), *Pygarctia.*

1903, Holland, Moth Book, p. 136 (partim. nec text fig. 76, nec pl. XVI, f. 17), *Pygarctia.*

Described from 1 ♂, 1 ♀, Owen's Valley, California.

We received a ♂ and ♀ bearing small white round pin labels "623," the pin of the female bearing the label "Euchætes elegans Str."

These agree identically with Stretch's description and figure, and we have little doubt but that they are the true types.

There are no claws on the fore tibiæ, throwing the species out of *Pygarctia* and into *Euchætias.*

Hampson's text figure 168 shows a tibial claw, and consequently the placement of the species he determined as *elegans* is correct, but he evidently had Mexican-Columbian specimens of some other species incorrectly identified as *elegans,* a species which is apparently unnamed, unless he drew his description solely from Stretch's publication and all of his specimens and his text-figure belong to what he terms ab. 1 *roseicapitis* N. and D., which is very likely.

Holland has fallen into the same error, and his text-figure is copied from Hampson. His plate-figure is apparently nothing but typical *roseicapitis* N. and D., which name must again assume specific rank.

If Stretch's description and figure be matched against specimens of *E. castalla* B. and McD. they will be found to fit. However, a critical examination of the types of both names

reveals that the types of *castalla* possess in both sexes much longer terminal bristles to the antennal pectinations than the types of *elegans*. A single male specimen agreeing with the type ♂ of *elegans* is in the Barnes collection from Kingman, Arizona, October 16-23. All other similar-looking specimens we have seen possess the longer antennal bristles of *castalla*.

We have a long series of *castalla* from Santa Catalina Mountains, Baboquivari Mountains, Redington, Douglas, Phoenix, and Christmas, Gila County, Arizona. The type, and only specimen we have seen, of aberration *griseopunctata* B. and McD. possesses antennæ similar to those of the type of *castalla*.

EUCHÆTIAS OREGONENSIS Stretch

1873, Stretch, Zyg. & Bomb. N. Am., p. 187, pl. VIII, f. 7, ***Euchætes*** (!).

Described from a single ♂, Oregon, Coll. Stretch, from Lord Walsingham.

Three specimens were received: 2 ♂, 1 ♀. All belong to the species now going under the name *oregonensis* in collections. The female is labeled "Adirondack, New York," "Oregonensis Str.," and hence can scarcely be the type. One male is labeled "Near Hot Springs, Las Vegas, N. M. 7000 ft. July '82. F. H. Snow," "19," "Euchætes oregonensis Str.," and can scarcely be the type unless labels have been changed. The pin of the other male simply bears a small round white pin label "622," presumably referring to a catalogue of the Stretch collection, which we are informed has been lost or destroyed. This specimen agrees well with the original description and figure, and is very likely the type. Even if it is not the type, the correct determination of the name *oregonensis* seems beyond reasonable doubt.

GROTELLAFORMA LACTEA (Stretch)

1883, Stretch, Ent. Amer., I, 103, ***Cisthene.***
1900, Hampson, Cat. Lep. Phal. B. M., II, 373, (ignot.), pl. XXIX, f. 26, ***Illice.***
1903, Dyar, Bull. U. S. N. M., LII, 81, No. 818, ***Clemensia.***
1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 119, pl. III, f. 32, ***Cisthene*** (?).
1917, Barnes & McDunnough, Check List, p. 31, No. 893, ***Clemensia.***
1922, Barnes & Benjamin, Contr. N. H. Lep. N. A., V, (1), 26, (ignot.), ***Grotella*** (?), ***"Cisthene."***

calora Barnes.

1907, Barnes, Can. Ent., XXXIX, 68, 93, ***Grotella.***

1917, Barnes & McDunnough, Cont. N. H. Lep. N. A., I, (4), 11, pl. IV, f. 7 (type ♂), *Grotella.*

1922, Barnes & Benjamin, Contr. N. H. Lep. N. A., V, (1), 24-26, pl. I, f. 17 ♂ genit. (topotype), *Grotellaforma.*

Lactea was apparently described from more than one specimen, Providence Mountain, San Bernardino County, California.

A single male labeled "Cisthene lactea" was received. This agrees with the original description, although it does not identically match Stretch's later figure in number of black spots present on the primaries.

Hampson's figure of *lactea* is poor, not agreeing with either the original description nor Stretch's figure.

The species is not common in collections (although Poling recently sent us a series of specimens from the Baboquivari Mountains, Arizona).

When we wrote our revision of *Grotella* (1922), we placed *lactea* as possibly an unknown *Grotella,* because of the habitus indicated by Stretch's figure and description, and because we knew of one white-winged *Grotella* (*stretchi* B. and Benj.) from Riverside County, California. We named *stretchi,* from the desert, because it was obviously not *lactea,* and concluded that in all probability *lactea* was an allied species from the mountains. At that time we only knew *calora* from type localities, and thought likely it was restricted to the region of Southern Arizona to the Argus Mountains. Since then, more specimens have come to hand, and these, with a few found in unsorted material, enable us to record the species from the following additional localities: Mohave County, Hualapai Mountains, Mohave County, Baboquivari Mountains, and Ajo, Pima County (west of the Baboquivari Mountains), Arizona, and Clark County, Nevada.

There is little doubt but that the Stretch specimen we received is conspecific with *calora.* At the time of our original description of the genus *Grotellaforma* we overlooked an almost microscopic spine on the inner side of the fore tibia, usually completely hidden by the tibial vestiture. Our description should be changed to include this spine. We have been totally unable to find any other spines on any of the tibiæ, although we have carefully descaled the tibiæ of a number of specimens. The Stretch specimen complies with *calora* in

maculation, frons, and tibial armature. Fortunately it is a male, and the genitalia were sufficiently open so that the corona of spines shown in our figure of the valve of *calora* could be easily seen. Our text in this regard should read "dorsal corona" instead of "ventral corona." Our figure is correct.

The species is quite variable in the presence or absence of any of the black spots on the primaries, and the color of the secondaries as stated in our revision, "usually fuscous, occasionally rather pale." The Stretch specimen has pale secondaries, which he might well have considered white, while the type of *calora* has fuscous secondaries. Two "cotypes" of *calora* have the secondaries intermediate, while we have other specimens with secondaries as pale as the Stretch "type." In the series before us, the freshest-looking specimens have the darkest hind wings, while rubbed specimens have the palest. We do not know if pale specimens occur in fresh material or not. The Stretch "type" is so badly rubbed that no fringe is present on the wings.

HARRISINA AMERICANA AUSTRALIS Stretch

1885, Stretch, Ent. Amer., I, 102, *Harrisina.*

1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 119, pl. III, f. 42, *Harrisina.*

Described from Florida, Henry Edwards, ♂.

A single ♂ is in the Stretch collection, labeled "Indian Riv., Florida"; another label reading, "Harrisina australis type."

This specimen agrees with the original description, and is probably the true type. The name has been correctly identified in collections.

HARRISINA METALLICA Stretch

1885, Stretch, Ent. Amer., I, 102, *Harrisina.*

1906, Stretch, Jour. N. Y. Ent. Soc., XIV, 119, pl. III, f. 41, *Harrisina.*

Described from specimen (s?) received from Professor F. H. Snow, New Mexico.

A single ♂ is in the Stretch collection, labeled "New Mexico, F. H. Snow," another label bearing "2," and a third label reading, "Harrissina metallica type."

This specimen agrees with the original description, and is probably (one of) the true type (s). The name has been correctly identified in collections.

THE ENTOMOLOGY OF THE GULF OF CALIFORNIA*

Costly expeditions are sent to the most remote regions of the world in search of scientific treasures, but we do not always realize how much may still be done in North America, with relatively small expenditures of time or money. The Gulf of California Expedition was in the field about three months with a personnel of nine, and it is not too much to say that the results achieved are epoch-making in relation to the natural history of the region. The life of the gulf islands, in particular, has been elucidated in a way never before possible. The present notice is concerned only with the insects and other terrestrial arthropods, so far as reported on. Much of the material still awaits study, but the published accounts enumerate about 950 species, of which 420 species or races were new to science. We may estimate that the total of the new forms, when all have been gone over, will not fall short of 600, and may run to 700. This omits all reference to the fine collection of plants, already described, the very important series of mollusca, etc., all obtained by the expedition. However, all this successful effort would have been of comparatively little value had it not been possible to have the specimens studied and the numerous resulting papers published. The Academy is to be congratulated on the excellent appearance and promptness of its reports, so that already the principal results are available to the scientific world.

It is, of course, true of such work as this, that it raises a number of interesting questions which must eventually be answered, if at all, through further research. There are reasons for thinking that the southern end of the peninsula was formerly a large island; also that the islands of the southern portion of the gulf are older (as islands) than those north of the latitude of Guaymas. The problem of the smaller islands is particularly fascinating, as it may eventually be possible to use their biota to determine the rate of evolution of species in

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* Expedition of the California Academy of Sciences to the Gulf of California in 1921. Proc. Calif. Acad. Sci. Ser. 4, Vol. XII, Part VI (General Account), VII (Bees—I), VIII (Dolichopodidæ), IX (Geometridæ), X (Tineid Moths), XI (Hemiptera), XII (Tenebrionidæ), XIII (Bombyliidæ), XIV (Coccidæ), XV (Dermaptera and Orthoptera), XVI (Embiidæ), XVII (Pseudoscorpions), XVIII (Chilopods and Diplopods), XIX (Melyridæ), XX (a new Noctuid), XXI (Anthomyidæ and Lonchaeidæ), XXII (Bembicini), XXV (Diptera, General Account), XXVII (Bees—II), XXVIII (Spiders), 1923-1924.

different groups. Thus we find that there are undoubtedly endemic forms of reptiles and snails on these islands, but it is questioned whether there are any truly endemic flowering plants. With regard to the arthropods, we can only say that many species are known from these islands, but whether they are all or mostly peculiar to them cannot be stated on the basis of present knowledge. It can hardly be without significance that all the six kinds of bees found on San José Island were new, and of 16 from Angel de la Guarda Island 12 were new. Of 18 bees from Tiburon Island, 10 were new, but of 41 from Guaymas only 19 were new. However, Angel de la Guarda Island, which produced such a large proportion of new bees, gave 12 old and 7 new spiders, and 5 old and 2 new Tenebrionids. The places which gave more new spiders than old were San Pedro Bay, San Carlos Bay, San Esteban Island, San Evaristo Bay, Puerto Escondido, San Luis Island, Tortuga Island, San Marcos Island, Santa Catalina Island, Los Galleras Island, San José Island, and Ceralbo Island. The places which produced more new Tenebrionids than old were Tepoca Bay, Guaymas, San Esteban Island, Angeles Bay, Gonzales Bay, San Nicolas Bay, Puerto Escondido, La Paz, San Luis Island, San Marcos Island, Santa Inez Island, Ildefonso Island, Coronado Island, Santa Catalina Island, San Diego Island, and Espirito Santo Island. There is thus no very clear evidence of endemicity apparent on comparing the results from different groups of arthropods. In the Madeira Islands I have observed a remarkable development of slightly modified but quite distinguishable insular forms among the Tenebrionidæ and Carabidæ, some of them on very small islets. It can hardly be doubted that analogous phenomena occur elsewhere.

The Diptera of the expedition, elaborated by Messrs. Cole, Malloch and M. C. Van Duzee, show a number of interesting features. Several forms still await examination, but enough has been done to show the great preponderance of Bombyliidæ: 73 species, of which 28 were new. Only 27 new Diptera were found among all the other families combined, so far as studied. This abundance of Bombyliidæ is noteworthy because in Miocene times, as shown by the Florissant deposits, this family appears to have been dominant and varied, taking the place, as parasites, of the Tachinidæ, which do not appear in the Floris-

sant beds at all. I do not mean to suggest that there were no Tachinidæ in those days, but only that they were, at any rate, rare or absent in North America. It must be remarked, however, that the Lower California Bombyliidæ are disappointing, in that they include hardly any of those rare and isolated genera which are closely related to a great series of extinct genera present in the Miocene rocks. I had strong hopes that the expedition would discover one or more of the Miocene genera in a living state, but nothing of the kind appeared. Instead of that the list includes no less than thirty-five forms of Villa (Anthrax), belonging to a section of the Bombyliidæ apparently quite absent from the Florissant shales. In several of the papers attention is called to species which belong to genera or groups elsewhere known only from remote parts of the world. Undoubtedly, the Lower California Peninsula and adjacent islands are more likely than most regions to exhibit these relic species, and it may be anticipated that more intensive collecting at various seasons of the year will bring to light a number of ancient survivors from an earlier epoch. The land shells are especially significant in this respect, but the insects, on account of their numbers, afford great opportunity for discovery. Anyone who has studied the geographical history of a fauna comes to see in the existing biota a number of groups of different age. Some have evolved in comparatively recent times, others are extremely ancient. Some had their origin at or near the place on which we find them, others migrated from the other side of the earth. Thus a mere faunal list, at first sight so lacking in interest, takes on dramatic features and contributes to our understanding of the philosophy of nature.

It may perhaps be disappointing to some to find that the great work of exploration and investigation carried on by the Academy does not seem to lead us nearer to the completion of our tasks. Instead of that it opens up new vistas which lead us on and on to a land that no man knows. We should be happy that it is so, and in the assurance that the door of opportunity for significant scientific research cannot be closed in the Pacific Coast region for an incalculable period. Or, rather, it cannot be closed so long as we care to keep it open by our labors and material support.—T. D. A. Cockerell.

ECONOMIC NOTES

BY E. O. ESSIG
University of California, Berkeley, California

An Outbreak of Telea Polyphemus

About 400 yards of a double row of large elms, four miles north of San José, California, have been completely defoliated by larvæ of the polyphemus moth (*Telea polyphemus* Cram.). At the time of observation, November 1, 1924, cocoons were numerous in the trees and on the grass at the base of the trunks. A few fully grown larvæ were also seen. Some of the cocoons showed emergence holes of the adults, probably indicating that this was a second brood. Most of the cocoons seemed to be smaller than normal.—Victor Duran.

A Predacious Helix in South Africa

We have many Helix here: quite a pest, in fact, but they have one good trick. They climb the plants and eat off the white wax scale, *Ceroplastes destructor*. I was puzzled for a long time at seeing denuded scale bodies and others which had been eaten. At first I thought it was all done by birds (some is), but finally I found most of it was the work of snails, done during the night and in early morning while the dew is still on.

As far as I can learn, this is the first record of Helix eating scale, but there is absolutely no doubt about this observation, as I have caught them at it many times of late. I suppose they are after the wax principally.—E. W. Rust.

Capetown, September 29, 1924.

Mating Habits of Polistes

During the late autumn of 1923, in the neighborhood of Nanking, China, I observed that the males of a large species of Polistes would fly to the sunny side of various trees, run about for a few seconds, then extend the abdomen backwards and apparently discharge some volatile substance. In a short time they would be joined by females, and mating would occur soon after. The males of the species observed are very differently marked from the females, so are readily distinguished. This method of the male attracting the female was observed many times, for after my attention was called to it I made a point of watching for it and of carefully checking all the facts. As

much as I had always believed the males sought the females, as is the case with most other insects, I was considerably surprised, and, not finding any mention of this fact in the literature, am reporting it.—Edwin C. Van Dyke.

Coloradia Pandora in Oregon

While cruising timber in Central-Southern Oregon during the summer of 1924, I had an opportunity to observe the emergence and flight of the large Pandora moth (*Coloradia pandora* Blake). This moth belongs to the family Saturniidæ. It is of economic importance, in that it attacks yellow pine and in many cases defoliates the trees, due to the enormous number of the larvæ.

The life cycle is of two years' duration. The moths fly one year and lay eggs. These eggs hatch and the young larvæ go into hibernation. The following year these larvæ feed, and when mature pupate in the ground. Thus the second year after an egg-laying sees emergence and oviposition again. I cannot say as to overlapping broods.

The first moth seen was on June 20, in the Sprague River Valley near the locality of Yainax. In a few days the flight of the males could be noticed, and by July 1 the height of emergence was on. At this time fluttering moths could be seen everywhere through the woods. A dozen or more females could be found on almost every tree in some localities, and were abundant throughout the brush. The males, beating their wings on the trees made a noise resembling a wind. The height of the daily flight of the males was between midnight and noon. The last male was seen on July 20.

The size of the moths undoubtedly lent a certain color to their emergence, making it very conspicuous. Having never observed the defoliation, I can only say that reports are that it is severe. Thus, both in flight and economic damage, this insect is very striking, as well as in having a peculiar life cycle.—Hartford H. Keifer.

November 22, 1924.

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E. P. VAN DUZEE, Editor F. E. BLAISDELL, M. D., Treasurer

EDITORIAL COMMENT

The Third International Congress of Entomology will be held at Zurich, Switzerland, July 19 to 26, 1925, with Dr. A. V. Schulthess as president. General Secretary Dr. Leuzinger, Gloriastrasse 72, Zurich, 7, Switzerland.

All entomologists are cordially invited. For the Executive Committee. HENRY SKINNER.

The first and second congresses held at Brussels and Oxford, respectively, were very successful, and it is now proposed to hold the third congress in a neutral country where entomologists of the belligerent countries could meet without embarrassment, and Switzerland has been suggested as a suitable place, attractive in many ways and convenient for the majority.

Professor W. B. Herms has recently returned from a trip to the Fanning Islands, where he went to study certain injurious insects which have been attacking the cocoanut palms. He also made a biological survey of the islands.

Mr. H. C. Fall spent his summer vacation in Alaska, visiting many of the old type localities for insects.

Volume XIII of the Proceedings of the California Academy of Sciences (1924) includes the following entomological papers:

No. 13, E. P. Van Duzee, The Genus Erythroneura in California. 6 pages.

No. 17, Frank E. Blaisdell, New Melyrids from Southeastern California. 11 pages.

No. 19, T. D. A. Cockerell, and Grace Sandhouse, Parasitic Bees (Epeolinæ and Melectinæ) in the Collection of the California Academy of Sciences. 20 pages.

No. 20, Leland H. Taylor, Chrysididæ from Lower California. 8 pages.

No. 21, Grace Sandhouse and T. D. A. Cockerell, Expedition of the California Academy of Sciences to the Gulf of California in 1921. The Bees, III. 7 pages.

No. 22, Grace Adelbert Sandhouse, Bees of the Genus Osmia in the Collection of the California Academy of Sciences. 32 pages.